CREATIVE URBAN REGIONS
Harnessing Urban Technologies to Support Knowledge City Initiatives
Tan Yigitcanlar
Knowledge-Based Urban Development: Planning and Applications in the Information Era

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This book is dedicated to Tugyan Yigitcanlar (1973-2005), who was a talented knowledge worker, and an excellent brother, colleague, and friend to us.

Tan Yigitcanlar, Koray Velibeyoglu, and Scott Baum
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Urban Development and Knowledge Environment

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Today, knowledge is addressed as a key driver in urban development. From an urban planner’s perspective, however, it seems that the knowledge we talk about is “out there” in so-called knowledge industries. Knowledge-based urban development refers to development of city regions that are more or less driven by the knowledge-economy, or to opportunities to attract knowledge workers in order to fuel economic growth in specific areas. The aim of this chapter is conceptualizing what knowledge and learning mean to, and in, contemporary planning praxis. The chapter discusses the key concepts of knowing and their relation to doing. By mooting a theory of assemblages, the chapter further provides a foundation for the analysis and the enforcement of learning in urban development praxis. Drawing on research on learning organizations, this chapter provides a basis for the contribution of urban planning to knowledge-based urban development.

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The terrain of knowledge-based urban development is currently confused by a plethora of competing, implicit, and unarticulated assumptions that have resulted from differing interpretations of knowledge and the urban, and the relationship between them. This chapter offers a conceptualization of the role of academic knowledge and, by extension, the university in processes of urban development through the lenses of theory, policy, and practice. A distinction between knowledge-based urban development as process-, product- or acquisition-driven is developed. It then assesses the relative balance of these roles in policy and practice through a case study of Manchester, North West England, and, in so doing, distinguishes between the rhetoric and the realities of attempts to do knowledge-based urban development.
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As the 21st century progresses, the most successful economies and societies will be creative ones. Worldwide, governments are producing strategies to encourage the development of creative industries, and to strengthen the role of knowledge cities nationally and internationally. There is significant policy discussion regarding the role of creative clusters in strengthening local economies, and significant energy has been expended discussing the many positive outcomes of such developments. This chapter takes these issues as a starting point and considers the role of creative industries within broader concerns regarding regional development. Referring to data and analysis on the urban and regional geographies of creative industries, the chapter considers the extent to which places at different levels of the settlement hierarchy can successfully develop creative industry nodes.

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This chapter presents Singapore as a case study for the management of change as Singapore transits from a knowledge-based economy to a creative economy. Analysis of the knowledge-based economy suggests that competitive advantage is increasingly derived from investment in intangibles, particularly information and knowledge-based competencies. The film industry is chosen as a microcosm-level of analysis to examine the state of the creative economy as the latest phase in Singapore’s economic development as technology and information are increasingly used to navigate and mediate its people, resources, and capital. The objective of this research is to examine the types of competencies that enable firms in the industry to stay competitive in the contemporary knowledge-based economy in light of technological development in the industry. In so doing, it seeks to shed light on what matters for the industry and the role that government has in shaping the creative economy.

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This chapter is presented especially for the use of practicing planners. Practicing planners, as intended here, are broadly defined and inclusive as a set of local stakeholders. Given the widespread need to develop an active civil society, it is important that representative local actors and diverse urban and regional stakeholders engage in developing their communities intelligently over sustained long-term futures. Practicing planners in this context include, but are not limited to, professional urban and regional planners. Citizens and other professionals, such as business persons, bureaucrats from all levels of government, employees from nongovernmental public organizations and their volunteers, and other individuals all have stakes in and contributions to make to the development of their city-region in the
relatively new context of a globalizing and increasingly knowledge-based world economy and networked society. The chapter, therefore, presents the background to these new development dynamics, and it introduces the ALERT model. In the form of a conceptual framework, the model is a planning support system designed for the use of the diverse and wide-ranging stakeholder-planning practitioners who seek to engage planning in the steering of these new technology-enabled and knowledge-based development forces to attained desired outcomes. The ALERT model is not so much directly prescriptive, rather it is directional and relational with the intention that engaged planning practitioners will design and tailor their own planning processes to be responsive to local demand and need. At its best, the model can catalyze and stimulate the stakeholders to invent their own strategies that capitalize on the unique assets and development potential of the locality’s communities.

Chapter VI
From University Town to Knowledge City: Strategies and Regulatory Hurdles in Germany / Peter Franz

The trend of cities, serving as a location for universities and research institutes, to take into consideration new strategies utilizing this location factor for growth-oriented urban development also can be observed in Germany. An overview of the quantitative preconditions shows that many German cities dispose of favorite preconditions for such a knowledge city strategy. An analysis of the policy arena comes to the result that the political actors are confronted with the task of a complex multi-level-policy where networking skills become essential. A comparison with the policy conditions in the U.S. makes it quite clear that especially the German universities have the status of semi-autonomous actors complicating negotiating and coordinating activities between city and science representatives. First examples of deregulation show that these hurdles can be overcome in the future.

Chapter VII
Queensland’s Smart State Initiative: A Successful Knowledge Based Urban Development Strategy? / Tan Yigitcanlar and Koray Velibeyoglu

During the last two decades knowledge-based development has become an important mechanism for knowledge economies. In a knowledge economy, information and communication technology is extensively seen as a potentially beneficial set of instruments, which may improve the welfare and competitiveness of nations and cities. At present, both public and private actors aim to exploit the expected benefits of information and communication technology developments. These technologies offer unprecedented promise for social and economic development on all global, national, regional, urban, and local levels. Therefore this chapter seeks to investigate the potential of information and communication technology policy at both regional and urban levels, and, in particular, to shed light on various factors that influence urban information technology policies in the public domain. The chapter sets out to explain the knowledge-based urban development processes and challenges, and opportunities in information acceptance, and use in urban policy making in Queensland, Australia. This chapter draws on providing a clear understanding on policy frameworks and relevant technology applications of the Queensland Smart State experience.
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Barcelona has been internationally recognized for its exemplary urban regeneration policy since the Olympic Games of 1992. By that time, the so-called “Barcelona model” was not only about urban planning and new economic strategies, but it also was about urban culture and social participation as well. After a period of stagnation, the new orientation of the municipal policy points to a more entrepreneurial logic. The growing role of private initiatives and the inclusion of information and communication technology in local policies are questions that affect the definition and shape of the new city, as well as the theory and practice of its governance. The 22@bcn Plan is one of the highlights of Barcelona’s change into a city of knowledge. This chapter asks whether and how this specific plan challenges the well-known Barcelona model.

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The rapid development of information and communication technologies had a significant effect on contemporary urban and regional planning. Ever since Mitchell (1999) envisaged a vision of E-topia, a development of robust delivery system for the digital network into knowledge-based urban development has been rigorously challenged. Information and communication technologies are evolving cities from virtual city, which reproduces urban elements inside the virtual computer world, to ubiquitous city, where the ubiquitous computing amongst urban elements, such as people, buildings, infrastructure, and urban space is available. Nevertheless, a strategic ubiquitous city planning is yet to be addressed in an integrated manner by planners and regional analysts because the technologies and applications still need to be fully developed. The Republic of Korea has recently had some experience in developing the ubiquitous city concept and planning principals as a means of knowledge-based urban development. This chapter introduces key ubiquitous technologies, and discusses implications of the ubiquitous city concept into planning and design schemes for knowledge-based urban development in the Republic of Korea.

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The internationalization of Big Science programs, such as the Human Genome Project to map the human genome, heralds the arrival of a new model for knowledge-based urban development driven by scientific advancements in biotechnology. Indeed, the biotechnology industry is a potent engine for knowledge-based urban development around the globe. While the most famous example of biotechnology-driven knowledge-based urban development is Biopolis in Singapore, the National Capitol region of the United
States is home to an emerging biotechnopole known as DNA Valley. Using a case study approach to compare and contrast DNA Valley with past examples of knowledge-based urban development in the United States, this chapter highlights the challenges for sustainable knowledge-based urban development in the global biotechnology industry and the practical steps public and private stakeholders can adopt to sustain knowledge-based urban development based on biotechnology.

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This chapter explores Sydney’s knowledge-based development, surveying reasons for its concentration of such development including the role of planning. Sydney’s high-knowledge industry concentration is seen as the product of the city’s commercial leadership, its high share of transnational corporations associated with Sydney’s global economy role, and its high proportion of skilled immigration. Such factors have resulted in a knowledge sector that is concentrated around central and near northern Sydney, and in the formation of several distinct clusters of knowledge-based industries. Case studies of the information technology and telecommunication industry, and the multimedia industry suggest that Sydney’s concentration of corporate headquarters has been a key driver of growth in these industries, while the presence of a large pool of computer-based skills has stimulated and fed multimedia development. Metropolitan planning strategies have lacked firm principles for the development of knowledge-based industries. Instead, planning for these industries focused on a series of ad hoc place-specific initiatives that have been much less significant than market forces in supporting knowledge-based development in Sydney.

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This chapter focuses on the growing territorial imbalances between urban regions in the light of the sometimes painful transition toward a knowledge-based economy. Drawing from the vast literature on urban competitiveness, it develops an integrative framework to assess and compare urban regions’ performance and assets in the emerging knowledge-based economy. In a second stage, the framework is applied to the Portuguese metropolis of Porto and Lisbon in order to illustrate how the current tendency toward de-industrialisation and knowledge-based development affects different types of cities. Using the framework concepts, the chapter concludes with policy recommendations to support national and urban policy makers toward urban competitiveness enhancement for our cases, whose rationales may constitute lessons to other similar contexts.

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Despite its strong technological profile, the city of Delft has problems to improve its employment situation. What is more, Delft’s considerable knowledge base has not been sufficient to promote a sustainable type of urban development that could benefit all of its citizens. This case-study analyzes Delft’s current
business and people climates with the purpose to indicate directions for the adjustment of Delft’s local development strategy to improve its sustainability. The results point out that Delft has placed very much emphasis on improving its business climate, but not so much attention has been paid to its people climate. Delft Knowledge City strategy still has little to offer to creative and foreign knowledge workers and students. In terms of people climate, shortages in housing and cultural amenities diminish Delft’s capacity to attract creative people. Further, the strategy still remains divorced from the worries of common citizens and the non-knowledge economic sector.

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Chapter XIV
Emerging Middle Eastern Knowledge Cities: The Unfolding Story / Ali A. Alraouf

Examination of the knowledge cities’ contemporary status reveals tangible developments and collective efforts for declaring and building such cities around the globe. On the contrary, Middle Eastern cities are building technologically isolated entities with the hope that they are promoting the knowledge city concept. An analysis of projects like Egypt’s Smart Village, Dubai’s Internet City and Knowledge Village, and Qatar’s Educational City and Science and Technology Oasis is insightful in the evaluation of emerging Middle Eastern Knowledge Cities. The purpose of this chapter is to explore the knowledge city concept in depth to relate it to the ongoing processes of creating knowledge-based economy developments in major Middle Eastern cities, particularly in Arab Gulf Cities. It discusses the principles of a knowledge city, and portrays its distinguishing characteristics and processes. In addition, the chapter introduces the concept of urban creativity engines in the context of the Middle East, and present examples of various types of creativity engines. Although this concept and its related terminologies are relatively new, the chapter proves that there are many historical examples of knowledge cities and creativity engines both regionally and internationally. A focus on the traditional-built environment of the Middle Eastern cities is included to support the main argument of the chapter.

Chapter XV
Creation of an Australian Knowledge Town: A Case Study of Sippy Downs / Phillip Daffara

This chapter presents an Australian case study of the planning and implementation of a new university town. It aims to evaluate the effectiveness of normative urban/regional planning practice applied locally to create a regional knowledge hub. The evaluation process surveys key stakeholders’ perceptions about the town’s development using traditional methods (e.g. SWOT) and alternative methods from the Futures Studies field (e.g. Causal Layered Analysis). The case study shows that a regional governance framework with collaborative partnerships focused on place management and infrastructure delivery is needed to realise Sippy Downs’ vision as a knowledge hub. It also demonstrates that a holistic policy framework for the town’s development also is needed to leverage the drivers of successful knowledge-based urban development.
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With the recent trends toward knowledge-based urban development and networked society, information and communications technologies have increasingly played important roles in the daily lives of people for social interaction, learning, information, and recreation. This research is an exploratory study on how information and communications technologies have been adopted in master planned communities of South East Queensland, Australia. It examines the four roles of information and communications technologies in the master planned communities: (1) teleworking; (2) creating a sense of community; (3) promoting integrated office and businesses; and (4) developing learning communities. More recent master planned communities in South East Queensland such as Varsity Lakes, North Lakes, and Greater Springfield have integrated information and communications technologies for activities such as community internet portals; local business development; and for use in community learning centers, and education facilities. There is a potential to attract knowledge workers in master planned communities through the inclusion of cultural amenities information, and communications technologies and learning infrastructure. It is important that information and communications technologies and learning infrastructure not only benefit the housing estate but also the surrounding region thus putting a foundation for a knowledge-based urban region.

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Foreword

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KNOWLEDGE-BASED DEVELOPMENT: THE CHALLENGE FOR CITIES

Knowledge has always played an important role in the creation of wealth and has been at the core of city development since the dawn of civilization. It is only recently, however, that knowledge has been recognized as a primary factor driving city development (Greenfield with Knight, 1966; Knight, 1973a, 1973b; Stanback and Knight, 1970, 1976; Knight, 1976, Gappert & Knight 1982; Knight 1986; Knight & Gappert 1989). Moreover, it is only recently that cities have been viewed as knowledge centers, as loci of cultures that produce and valorize knowledge, or as playing a major role in the governance of knowledge, in particular, humanizing knowledge by integrating different types of knowledge and protecting values of a local and regional nature (Knight 1990a, 1991a; Drewett, Schubert and Knight, 1992; Knight, 1992, 1993, 1994, 1995a, 1995b). Historically, cities have been thought of as being the principal artifacts of civilizations and generally conceptualized in terms of their population size and physical attributes, i.e., in terms of their land area, geographic location, morphology, equipment, etc. Consequently, their development has been viewed primarily from the perspective of city planning with a focus on their physical form and the built environment, i.e., on land use, zoning, building, health & safety codes, infrastructure, parks & recreation, aesthetics, etc. Very little consideration has been given to their knowledge resources or to the cultures that produce knowledge and comprise their knowledge base. The emphasis has been on attracting and accumulating tangible forms of wealth, on the factors of production—land, labor and capital—on increasing productivity, expanding markets, etc. Knowledge, being an intangible and difficult to quantify, has been largely taken for granted, seen as something that is ‘in the air’, as a ‘free good’. Moreover, culture has generally been regarded as something that wealth creates, as consuming wealth rather than as a resource that creates wealth. Now, with the advent of an increasingly global and knowledge-based society, greater attention needs to be given to the cities’ cultural assets and to their role as knowledge centers—to enhancing cultures that produce knowledge locally and regionally and to transforming that knowledge into local development. The old adage that ‘wealth creates culture’ needs to be reframed; culture’s role in producing knowledge needs to be recognized. Cultural resources need to be seen as creating rather than consuming wealth.

Knowledge is now the cities’ primary source of power and the challenge for cities is to enhance and to build on the strengths of their knowledge resources, a difficult challenge indeed given the nature of knowledge development(Knight, 1995a). Knowledge is produced by cultures and most cultures producing knowledge are centered in cities. Moreover, cities are centers where citizens ultimately have to assimilate different types of knowledge into their daily lives. However, as the role of knowledge in wealth creation increases and the global economy expands and becomes increasingly knowledge-based, values of a local nature are trumped by global values. The quality of life in the cities will continue to
decline unless cities protect local values and support efforts to valorize local knowledge. Global values, primarily scientific and technological in nature, are key factors in advancing material well-being, determining exchange values in market economies, and so forth; local values, primarily traditional human and ecological values, often referred to as “genius loci,” are reflected in the “sense of place” and are essential for sustainable development (Sinding-Larsen, 1991; Norberg-Schultz, 1984).

The city’s primary role as a center for the production and valorization of knowledge can perhaps best be defined by the enhancement of cultures based in the city and region that produce knowledge. Values of a universal or global nature, however, without values of a local and regional nature, strip cities of their character and individuality. Cities are primary civilizing forces, anvils of civilizations, places where knowledge is advanced and new values are forged, where knowledge is passed on to succeeding generations, and where developmental synergies are realized. City life is greatly enriched by the presence of different types of cultures, particularly when they are integrated. As Toynbee and others have argued, “To be a city in the full sense of the word, a place has to have evolved at least the rudiments of a soul. This is the essence of cityhood” (Toynbee, 1967; Mumford, 1943). Cities need to be responsive to the concerns and intentions of cultures and organizations that produce knowledge of a global nature. The knowledge sector is an important and growing component of the city’s economic base, and it’s to the city’s advantage that knowledge-based organizations remain well-anchored in the city. Cities also must protect and promote local and regional values because they determine the quality of life in the city. Moreover, the atmosphere and habitability of the city affect the quality of communications and the exchange of knowledge—key factors that determine cooperative action. Maintaining a balance between global and local forces and integrating various knowledge-producing cultures lie at the core of knowledge-based city development. Compared to the efforts made by national governments and internationally organized businesses to advance and promote values of a global nature, very little support is given to protecting or advancing values of a local and regional nature or the integration of local and global knowledge.

A knowledge-based approach to city development seeks to address these issues by providing a framework for defining the city’s role as a knowledge center. Identifying the needs of the city’s knowledge sector and creating a milieu conducive to knowledge-based activities are critical. Cultures producing global knowledge are of particular concern because, as they develop, their local linkages weaken and they become distanced and disengaged from the affairs of the city (Knight, 1976). If cities are to fully realize the benefits of their presence, they have to make a concerted effort to maintain and strengthen these relationships and create conditions conducive to the continued development of knowledge-based organizations. The city’s mentality from which it drew strength in the past may be endangering its advancement. As cities develop, they inevitably have to change their personalities.

Globalization and rapid urbanization have changed the nature of city development. Until the 19th century cities accounted for a relatively small part of the world’s population. The growth of cities was highly constrained: most cities were walled, grew slowly, in an orderly and self-regulated manner with considerable participation by the citizenry. Then, with the advent of industrialization, the rise of nation states, large-scale mass production, rapid urbanization, and improved communications, markets expanded. Power became increasingly centralized in national and corporate power centers and cities began to lose control over their development. With globalization and the international division of labor, cities began morphing into shapeless and diffused urban agglomerations. They became sprawling metropolises, polycentric megalopolises, and mega-cities with less and less control over their own development. The situation is particularly grave in the less-developed countries where traditional village-based rural societies are collapsing. Rural dwellers have few options other than to migrate to major population centers in search of economic opportunity. These new forms of urbanization are inevitable, according to some pundits who recognize that these forms are dictated by technology and the advancement of knowledge. They argue that the modern world is simply becoming flat, and furthermore, that as long as technology advances and urbanization continues to be driven and shaped by free market forces, cities...
will become more and more alike. Some even foresee the homogenization of urban space and a global society without cities.

The decline of cities, however, is not inevitable. Although many cities are beleaguered by changes, the city will remain a core social value, particularly in Europe and parts of the world where cities were formed prior to the industrial era and the formation of nation states. Where cities remain polities, where citizens continue to have strong attachments to their cities, and where cities continue to have significant powers over their development and are able to provide their citizens with amenities, local values can prevail. Even though global knowledge is being advanced rapidly and power derived from global values is becoming increasingly concentrated in national capitals, multinational corporations and financial centers, the cultures that actually produce knowledge continue to be centered in cities. All cities have knowledge resources; however, few are aware of the nature or importance of their knowledge resources or the power derived from knowledge being produced locally (Knight, 1977, 1981). As Francis Bacon noted “Ipsa Scientia Potestas Est”—knowledge is greater than the use of force (Bacon, 1597). City development strategies are slow to change; they generally remain oriented toward particular industries and toward the production sector (Knight, 1983). The city’s knowledge base is its future economic base, but knowledge-based development is founded on a very different set of attributes, attributes that vary not only by type of culture producing knowledge but also by place. Cultures producing knowledge evolve slowly. They usually begin inconspicuously, drawing on local resources, deepening their roots, and broadening their support networks and influence as they develop. Once established, these cultures are very difficult to replicate or transplant. They require continuous renewal for they tend to atrophy over time, and, once lost, are very difficult to reestablish. Barcelona, which was stripped of many of its knowledge resources during Franco’s regime, is now facing this challenge head on. Knowledge-based city development is basically a process in which citizens collectively shape the development of their city by enhancing cultures producing knowledge in the city. All the cultures producing knowledge in a city have to be actively engaged in articulating the intentions and concerns of the knowledge sector, and the city administration has to be responsive to their needs (Knight, 1990a, 1991a). Without strong citizen involvement cities will be unable to build on their strengths as knowledge centers and will continue to be shaped primarily by ubiquitous market and technological forces melding into the emergent world culture.

There is a growing concern that cities shaped through the centuries by the agency of the civic process are endangered and that urbanization shaped by anonymous global forces is not sustainable (Knight, 1993). The nature of city development has changed significantly in recent decades; the agency of civic process, which used to occur spontaneously, is no longer operative. Many factors are contributing to this breakdown of the civic process: citizens have greater demands placed on their time, increasingly specialized vocations, more vertical communications, increased mobility, and less attachment to a place. Linkages between different knowledge cultures in cities are in decline, and synergies between different types of knowledge cultures based locally are not being realized. Social goods are traded off for material goods. Special interests organized at the national level crowd out local interests. Cities, with their ever-radiating sprawl, become increasingly segmented, fragmented, and dysfunctional (Knight, 1990b, 1991b). The secretary to the Bishop of Genoa described the situation quite succinctly during a discussion about Genoa’s development as a knowledge center. “What we are asking is, ‘Who is the city?’ There is no city! There are no collective interests; there are only special interests. Moreover, there is no mechanism for defining the collective interest’” (Knight, 1991c). In short, citizens are living increasingly isolated lives, the city is dissipating, and cities are becoming increasingly disconnected from their knowledge base.

Cities are at a pivotal point in their development. They are the nexus of the global knowledge-based society, and their role in the governance and humanization of global forces is critical. Either they have to reassert their role as a civilizing force and willfully shape their own destinies or their future will be shaped accidentally by external forces. Some cities already are becoming ungovernable. Given the nature
of the growing knowledge-based global society and the role nation states play in advancing science and technology, expanding markets and promoting trade, global forces will not abate, they will continue to intensify. Nevertheless, as knowledge centers, cities do have the potential to shape their own destiny. Redefining their role as knowledge centers in a global context provides a framework for reassessing the nature of a city’s power. That redefinition is the city’s tool for identifying its global assets as well as its local and regional assets that require valorizing or safeguarding.

Knowledge-based city development can perhaps best be approached as a social learning process, as a way for citizens of a city to inform and become informed about the nature of changes occurring in their city. Particular attention must be paid to the nature of their knowledge resources, how cultures in the city produce knowledge, and how this knowledge is used to create wealth that is transformed into local economic development (Knight, 1995b). This type of learning does not occur spontaneously or through established channels; if it is to occur, it has to be carefully orchestrated. Cultures producing knowledge have to be identified; defining knowledge as “truth in judgment” helps to distinguish between knowledge that is a quality and information that is a commodity. Key actors from different types of knowledge cultures have to be engaged in the process, and the process has to be ongoing. Even though knowledge resources are present in every city, very few persons, other than those directly involved in building them, understand their strategic importance or their development potentials. Proximity of knowledge resources does not mean they have propinquity. As the city planner in Delft explained during a prototype study of knowledge-based development, the city has to build bridges between all the islands of knowledge. Engaging key actors in each of the principal types of cultures producing knowledge in the city is challenging; they have to be convinced that their efforts will be productive. Establishing appropriate channels of communication takes time. In Vienna, principle actors in the knowledge sector representing some 55 different types of knowledge cultures were engaged in a series of dialogue seminars about the nature of change so that the collective intentions and concerns of the knowledge sector could be clearly articulated (Knight, 1994; Caraça & Carrilho, 1993). Without this type of communication between the city and its knowledge sector, how can a city and its administrators increase their understanding of the nature and needs of its knowledge base? Both the city and its citizens must be informed of the nature and challenges of its knowledge-based development so they can better understand the role that their knowledge resources play in wealth creation. Then they can identify ways of enhancing the cultures that produce knowledge. This is, indeed, a major undertaking for a city, particularly for industrial cities that have evolved into sprawling metropolises and have become politically, economically, and socially fragmented (Knight, 1986).

Although the future of cities as production centers may be limited, their future as knowledge centers remains open. Globalization places a premium on knowledge and, as communication costs decline and access to information improves, the valorization of knowledge becomes ever more feasible. The demand for and production of knowledge certainly will continue to expand as the market for knowledge becomes increasingly global. Cities will benefit from the growing role that knowledge plays in the wealth creation because, as argued above, knowledge is produced by cultures and most cultures that produce knowledge are based in cities. Consequently, cities will continue to develop as long as knowledge cultures evolve. Knowledge cultures generally advance through a process of specialization; specializations becoming increasingly differentiated with their own values, language, and organizational structures and networks. Consequently, as knowledge-based activities advance and their specialized networks expand, local linkages are replaced by global linkages; as local linkages decline in importance, their knowledge resources become increasingly independent, separated, and isolated from their locality. Knowledge resources are frequently found in clusters and may have common origins but that does not mean they continue to have close linkages—proximity without propinquity is the norm. If local linkages are to be maintained, cities have to take the initiative. They must close the knowledge gap and engender communication and trust. If no effort is made to maintain these local linkages, the knowledge gap between those responsible for
advancing knowledge and their locality will widen, and, over time, become increasingly difficult to bridge (Knight, 1960, 1973a, 1973b; Knight and Stanback, 1970, 1976). Cities are becoming more aware of the knowledge gap and are finding ways to bring the idea of knowledge-based development into their culture and to build on the strengths of their knowledge base (Knight & Gappert, 1989; Knight, 1982, 1991d, 1991f, 1992; Drewett, et al., 1992).

Global society is basically an open society—multi-polar, multicultural, self-governing, and competitive. Although the emergence of a global society is imminent, the idea of a global city still is little more than a metaphor. However, the metaphor is useful because it presents cities with a way of broadening their vision, and identifying and focusing attention on strengths and opportunities that otherwise may be overlooked. Some cities are actively pursuing the goal of becoming global (knowledge) cities, and the number will no doubt increase as more cities become aware of their opportunities. Today, however, most cities are relatively passive, reactive rather than proactive (see Trono & Zerbi, 2002; Springer & Dente, 1987). Globalization provides cities with new and exciting opportunities to develop their knowledge resources and position themselves as knowledge centers (knowledge city) in the expanding global knowledge-based society. Cities can shape their destinies if their development is knowledge-based. Knowledge-based development hinges on two interrelated factors—one on the advancement and integrity of knowledge and on the livability of the city. It is basically a question of cities learning about the nature of their own development, of increasing their understanding of the nature of the forces, processes and principles driving the development of organizations that comprise their own unique, local institutional base.

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Foreword

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**KNOWLEDGE ECONOMIES AND URBAN PLANNING**

Some commentators question the meaningfulness of the term *knowledge economy*: in what sense is the dependence on *knowledge* unique to the current era? It could be argued that societies have always depended on knowledge to build their economies, and that the current era is no different in this regard. However, there are four features of modern economies that make the term *knowledge economy* meaningful (Hearn & Rooney, in press), and point to a societal dynamic, which, whilst continuous with the past, nevertheless must be understood by all who seek to intervene in some way in the operation of modern economies. Urban planners, then, are wise to grapple with the term *knowledge economy* and reflect on their practice in relation to it. The four features are:

1. *Innovation*
2. *Networks*
3. *Trans-disciplinarity*
4. *Cultural economy*

**Innovation**

Economies have always been built on primary industries such as resources and agriculture. And these industries are continuing to grow; in some cases, rapidly. However, the overall size of developed economies is growing faster than either of these sectors. This is because whole new categories of economic activity are constantly being invented (e.g., digital, biotech, services). Economic growth now occurs primarily via continuous waves of innovation. Industries that have existed for centuries based in the primary and secondary sectors continue to grow in absolute terms but shrink in relative terms as new industries emerge. These new industries are built around knowledge and products that, in some cases, did not exist a matter of decades ago. As such, there is a shift from an economy built primarily on tangible products to one built around intangible knowledge.

Economist Brian Arthur suggests that “the underlying mechanisms that determine economic behavior have shifted from ones of diminishing to ones of increasing returns” (Arthur, 1996, p. 100). Investments in primary resources run down over time as the resource is exhausted; whereas, investments in new knowledge (e.g., the Windows operating system) ramp up as more users subscribe. Increasing returns
eventuate because: the cost of product development is up-front (the overall unit cost of a product falls as sales increase); due to network effects, the likelihood of a product emerging as standard increases with greater use; and expansion into future markets becomes easier as more market is captured (customer groove-in) (Arthur, 1996). The new high-tech industries—computers, aircraft, and telecommunication for example—clearly illustrate this dynamic. Service industries, Arthur suggests, are characterized by a hybrid of both the old and the new: although demand for services is limited geographically and met by generally low-tech processing models, increasing returns can accrue to give market leaders an advantage—via brand loyalty for example. In this case it is the intangible resource of brand equity that accrues value.

Of course, older industries are continuously innovating and hybridizing with newly emerging knowledge. Innovation may occur not only in relation to technology and products but also in relation to processes, design, and markets. It is the ability to generate new ideas, concepts, products, and services, rather than deriving greater efficiency and economies of scale from existing production processes that has been a key factor in the transition from an industrial to a knowledge economy (Flew, 2007). Rapid cycles of innovation are thus a core feature of modern economies with which urban planning must come to grips.

Networks

Our growing dependence on networks is another core feature of the knowledge economy that impacts on urban planning. One of the defining features of many new products and services is that they exhibit network effects. That is, the functionality of many new products depends not just on its functionality but also on how it connects to others’ functionality. That is, its value derives from the total network of functional connections rather than any individual product. This is true in a technical sense (e.g., mobile phone networks); a service sense (e.g., credit cards); a software sense (e.g., operating systems), and a cultural sense (e.g., English language MBAs).

A process of economic evolution is generated in network economies by the development of new connections between tasks, technologies, firms, industries, and markets (Potts, 2000). As more of the economy becomes connected to previously unconnected parts, the scope and depth of innovation processes increases significantly (Morrison & Potts, 2007). Moreover, far from being a local process, new connections and networks form between regions, nations, and entire industries.

From an information science perspective, networks are ideal mechanisms of information resource allocation and flow; and this may be part of their growing importance. Structurally, they put people in direct contact via the provision of horizontal links across institutional boundaries, thus facilitating rapid information transfer. In addition to transmitting information, networks also help create it. New ideas may develop as each person in the network receives and synthesizes information; information easily builds on information. Thus, new ideas are both shared and created via networks. For example, Ahuja (2000) indicates that resource sharing and knowledge spillover benefits are primarily provided by strong ties. He also established that the network benefits of strong and weak ties are dependent on a number of other features and are limited to specific contexts.

The structural dynamics of networks are different from some of the other patterning mechanisms that urban planners take for granted; for example, hierarchies and grids. Barabassi (2002) and Watts (2003) show that the basic structure of what they term scale-free networks apply to many phenomena, ranging from cellular metabolism to the physical structure of the Internet, and protein regulatory networks to social relationships, as manifested by research collaborations, actors’ appearances in different movies, or sexual relationship networks. Scale-free networks are composed of connected nodes. Most of these
nodes are connected by a small number of links, whereas some—called hubs—may have hundreds, thousands, or even millions of links whilst retaining the basic distributive characteristics of the network; hence the term *scale free*. Thus, the distribution of connections between nodes is not even or random, but rather obeys a power curve. This property makes scale-free networks very robust against failure (only coordinated attacks against a number of hubs will break down such a network). The consistent features of scale-free networks are evidence of the self-organizing processes at work; that is, they work via an internal logical that requires no external guidance. Modern economies are characterized by the proliferation of these scale-free networks—in transport and communication systems for example.

**Trans-Disciplinarity**

Innovations that reach the market are rarely the products of single disciplines but rather involve compound multidisciplinary knowledge regimes. Modern corporations, for example, may be most distinguished by their ability to bring together composite knowledge (e.g., technical, marketing, legal knowledge). Commercialization depends on *whole product value propositions* not just basic research in one or two disciplines. Creativity is found across the scientific, technological, economic, and cultural domains, in diverse forms such as patents and designs, entrepreneurship, and artistic product: “no intellectual domain or economic sector has a monopoly on creativity” (Mitchell et al., 2003, p. 18).

Knowledge-intensive business services (KIBS) illustrate this well, combining generic knowledge from a broad range of domains with information from clients to diagnose problems, provide advice, and prescribe or implement solutions (Miles, 2007). The domains of knowledge on which KIBS may draw include, for example: those associated with social systems and institutions, especially administrative rules and regulations; supply chain management; educational, and clinical psychology and psychiatry; engineering; and IT services. As problem-solvers, KIBS are involved in generating new solutions and new knowledge, and their client can be understood as co-producer of this innovation. Technology-oriented KIBS assist in diffusing new techniques and systems throughout the economy, and R&D services are of course intimately involved with innovation, as they undertake knowledge-creation for their clients. Many KIBS are hybrid technology-oriented and professional services. For example, lawyers specialize in ICT or patent law, and financial advisors and market analysts provide expertise in high-tech or consumer innovation fields.

**Cultural Economy**

Any discussion of the new knowledge economy needs to foreground the importance of cultural matters. The construction of identity in our society has become thoroughly implicated in the market economy. Most economic activity is driven by consumption (60-70%) and increasingly directed toward the pursuit of cultural goods or goods with cultural components. A techno-cultural economic paradigm has replaced the techno-economic paradigm. The cutting edge of the knowledge economy is no longer defined by technological innovation alone; it is defined by an amalgam of technology and culture, which creates new market spaces. And yet innovation thinking is lopsided, in its formulation and execution, toward the scientific/technological disciplines. Although science, technology, and engineering are essential for economic growth they are no longer a sufficient condition for future economic success. Technology + culture is the formula for 21st century problem solving, and, hence, for growing the knowledge economy. There are a number of reasons for this.

Those sectors that derive in large part from the applied social and creative disciplines (business, media, entertainment, education), represent 25% of exemplary economies, whilst the new science sector (e.g.,
agricultural biotech, fiber, construction materials, energy, and pharmaceuticals) accounts for only about 15% of these economies (Rifkin, 2000, p. 52). The former also are growing faster and, importantly, are more labor intensive and therefore better for employment.

In relative terms, science and technology expertise is developing faster in Asia (particularly China and India), making it difficult to compete on science and technology alone. Just as the industrial revolution automated manufacturing and global labor markets saw manufacturing move out of developed countries, the computer revolution is automating knowledge work from accounting to routine drafting, and making it vulnerable to global markets. Much of this analytical work can be outsourced to Asia where knowledge worker salaries are much lower. As manufacturing and analytical work is outsourced to Asia, one of the few sources of competitive advantage is the ability to sense, predict, and capitalize on new market opportunities in consumer markets. This requires abilities derived from the applied social sciences and creative disciplines.

Indeed, all scientific innovations eventually must feed into markets, and the disciplines that govern speed and access to, and exploitation of, markets all derive from the applied social and creative disciplines. This is particularly so as affluence increases, and functionality and price cease to be sufficient for market dominance. Consumers are increasingly influenced by the aesthetic and experiential components of products. New forms of innovation are therefore based on intimate knowledge of, and facility in, creating consumer culture. Lucrative blue ocean markets—where you have no initial competitors—are only created by radical innovation in consumer spaces, not by technology innovation alone. This kind of innovation requires technology plus design plus culture. (Computer games and ipods are good examples.) The digital wave that is transforming all industries is beginning to move through the service sector, particularly in health and education. The new interfaces between consumer and producer are virtual, interactive, and visual, and the core competencies needed to ride this wave are creative cultural, together with technological.

Knowledge-Based Urban Development

A knowledge economy is one that is innovative, that understands and utilizes networks, that has the capacity to be transdisciplinary and has strong facility in applied cultural knowledge. Being competitive in this knowledge economy is not like running a race where all the competitors are independent or have an equal chance, and success depends on how good you are. Rather, it is like thriving in an ecology where everything is connected, and success depends on how you relate, how you build resources over time, and how every layer of the ecology supports you.

The creative field that undergirds the new economy is constituted as a constellation of workers, firms, institutions, infrastructures, communication channels, and other active ingredients stretched out at varying densities across geographic space. This network of forces is replete with synergistic interactions variously expressed as increasing returns effects, externalities, spill-overs, socialization processes, evolving traditions, and so on, and it is above all a locus of extraordinarily complex learning processes and knowledge accumulation (Scott, 2006, p.15).

As an ecology, the knowledge economy is dominated by a dynamic of connectedness. It is crucial for regions to understand their place in it and their interdependence with other elements of their environment. The emphasis on interconnectedness helps make “visible many of the less apparent and perceptible connections between... phenomena at a regional and even global level” (Heise, 2002, p.162), and their relationships of mutual independence with other industrial ecologies at the local, regional, national or global level.
Clearly then, urban planners have a significant role in helping to shape a city for participation in the knowledge economy, making this volume particularly pertinent at this point in time. Some time ago Landry (2000, p.140) summarized the conditions for a creative milieu that encourages innovation, suggesting it:

- Is a place with a level of original and deep knowledge coupled with a ready supply of skills, competence and people who have the need and capacity to communicate with each other.
- Has a sound financial basis allowing room for experimentation.
- Has the capacity to deal with complexity and uncertainty about future changes in cultural, scientific, and technological fields.
- Has good possibilities for informal and spontaneous communication internally and externally.
- Is a multidisciplinary and dynamically synergistic environment that links developments in the arts and science.

Interventions such as the Malaysia Multimedia Corridor Project and the Los Angeles garment district cultural upgrade, for example, illustrate the importance of urban planning in “enhancing the collective order of the creative field” (Scott, 2006).

_Cities in which high proportions of the labor force work in cultural-products sectors often express this state of affairs directly in their physical and social fabric. Landry (2000) has alluded to this phenomenon in terms of the encompassing notion of the creative city. Some of the most advanced expressions of this propensity can be observed in great city-regions of the modern world. Certain areas in these cities display a more or less organic continuity between the local physical environment (as expressed in streetscapes and architecture), associated social and cultural infrastructures (museums, art galleries, theaters, shopping and entertainment facilities, and so on), and the firms that cluster in adjacent industrial districts specializing in activities such as advertising, graphic design, audiovisual services, publishing, or fashion clothing, to mention only a few. Numerous cities have sought to promote this continuity by consciously re-organizing critical sections of their internal spaces like theme parks and movie sets, as exemplified by Times Square in New York, The Grove in Los Angeles, or the Potsdamer Platz in Berlin (Roost, 1998; Zukin, 1991, 1995). In these cities, work, leisure, and social life increasingly ramify with one another in synergistic interrelationship. The music scenes of Los Angeles and New York dramatically exemplify this trend, with their vibrant mix of live music venues, bars, restaurants, boutiques, and so on, and their associated recording industries (Scott, 2006, p. 14)._

Creative industry clusters are highly interdependent in nature, thus cultivating urban density and the development of healthy communities (Schoales, 2006, p 175). The degree of product innovation maintained by creative industry clusters in large centers such as New York tends to ensure these regions remain forever young. Product distinctiveness is crucial in these industries, and, as a result, they never reach a typical mature stage predominated by product standardization. This may help explain why New York, for example, stands in contrast to other cities that are troubled by decaying downtown areas.

The old economy style characteristics that traditionally dictate where a firm locates in a city (rent, labor supply, services, taxation) are being eclipsed by the ability to assist in a firm’s creation of value (Yusuf & Nabeshima, 2005). Factors include:

- Urban services and amenity
- Access to human capital
• Access to broad, stable, and sophisticated markets
• A diversified industrial structure, because the creative industries are interlaced with other sectors and because a diverse base of interdisciplinary skills are needed for unforeseen technological advances and commercialization
• Openness to new cultures and ideas

Echoing Richard Florida’s ideas, urban policies can have a significant influence on the retention and circulation of the highly skilled knowledge workers involved in creative industries. Yusef and Nabeshima (2005) emphasize the importance of cultural amenities, and educational and medical services to retain workers, and the development of transportation infrastructure as central to providing mobility and access to human capital. Other public sector tools that can have value include zoning and other urban policies that promote recreational and entertainment amenity, and the re-invigoration of inner cities.

The creative field as identified here is representable as a nexus of locationally-differentiated, multisclar interdependencies running throughout the domains of production, work, and territory. I have argued at length that attention to this tense force-field of relationships can help us understand a number of critical dimensions of the performance of modern economic systems. I have also suggested passim that very basic modulations of these relationships occur from place to place as a function of underlying spatial and locational processes. Geography, in other words, is not simply a passive frame of reference, but an active ingredient in economic development and growth (Scott, 2006, p. 18).

However, it is important to remember that large cities are not the only places where knowledge industry dynamics manifest, and, hence, where urban planners interested in the knowledge economy should focus their attention. The knowledge economy does not exist in an enclave but rather is embedded in all sectors. Because these processes of innovation are integrated, capillary-like, into existing industry and service sectors, more creative and design professionals are employed outside the core creative industry sectors than inside them. The knowledge economy discourse is therefore relevant to many scales of planning activity. The impact of knowledge thinking occurs in concept as much as planning outcome. Network thinking implies connection. Innovation implies flexibility of use. Transdisciplinarity implies eclecticism of planning paradigm. The cultural imperative means freedom from technocratic dogma. Knowledge economy concepts can influence policy, strategy, and narrative models as well as planning outcomes. I recommend the current book as a very exciting exploration of the impact of knowledge economy thinking on the urban planning process.

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Preface

In the last two decades, it has become apparent that knowledge is a major factor of (post)modern production. In the globalizing world, knowledge and information (and the social and technological settings for their production and communication) are now seen as keys to economic prosperity. Cities worldwide have undergone major transformations in the 21st century, an era in which the role of knowledge in wealth creation becomes a critical issue for cities. Urban administrations need to discover new approaches to harness the considerable opportunities of knowledge production for a global order.

Knowledge is produced by cultures and most cultures producing knowledge are centred in cities. To compete nationally and internationally cities need knowledge infrastructure (universities, R&D institutes, etc.); a concentration of well-educated people (knowledge workers); technological, mainly electronic, infrastructure; and connections to the global (knowledge) economy. Within cities, knowledge-based urban development has become an emerging area of research interest that links interests of planners, economists, geographers, and other social scientists. Despite this growing interest knowledge-based urban development still remains in its infancy. As the finite opportunities of globalized production are taken up on an ever-widening scale elsewhere, there is an urgent need for comprehensive research into the current state-of-play and the future potential of knowledge-based urban development. This book, which is a companion volume to Creative urban regions: harnessing urban technologies to support knowledge city initiatives (also published by IGI Global) focuses on some of these developments and issues. The forewords and afterword are written by respected senior academic researchers Richard Knight (Civic Process, USA), Greg Hearn (Queensland University of Technology, Australia) and Klaus Kunzmann (University of Dortmund, Germany). The book is divided into four sections each focusing broadly on a particular aspect of the knowledge-based urban development question.

Section I: Urban Development and Knowledge Environment

The four chapters in Section I consider the broad connections between knowledge creation, creative environments and urban development. Joris van Wezemael’s chapter presents an essay dealing with the debate of knowledge creation as a major challenge to understanding urban futures and the way in which contemporary urban planning deals with the uncertainties of knowledge-based urban development. He argues that knowledge creation in the context of practice is one strategy for urban development in order to meet the complexity of fluxing environments as theorized in relational urban geography. Moreover, he points to the issues facing urban planning practice when planning realities change from a linear sense to a non-linear sense as is likely to be the case with knowledge-based urban development. The significant points made by van Wezemael relate to the raison d’être of this book. He points to the need for significant advancement in both theoretical and empirical studies focusing on knowledge-creation in spatial planning, as without such contributions the current knowledge-gap that plagues research in this area will continue.
In the second chapter of this section Beth Perry considers knowledge-based urban development in England and asks how we should conceptualize the relationship between knowledge-based development and space given the ambiguities that exist between theoretical approaches and planning practice. Using a case study of the Manchester city region the chapter begins to question the UK experience of knowledge-based urban development and, as with the previous chapter, identifies potential policy tensions, particularly in relation to the balance between different scales of policy foci. In setting out her argument, Perry notes that the UK experience illustrates the ambivalence that surrounds knowledge-based urban development at the local level, an ambivalence that is the result of multi-level policy environment.

The third chapter in Section I focuses on the question of knowledge-based urban development and city scale. The chapter by Scott Baum, Tan Yigitcanlar, and Kevin O’Connor asks to what extent can calls for lower-order cities to develop creative industries be successful. As a part of a broader agenda of knowledge-based urban development, creative industries and arguments surrounding creative or knowledge workers have come to the fore. Given the persuasive nature of the work by Richard Florida it has not been surprising that many planners have looked toward the creative class model as a framework for city and regional economic development. This chapter questions the ability of lower-order cities and regions to successfully vie for creative industry activity and hence join in the knowledge-based urban development movement. Using a range of indicators, Baum, Yigitcanlar, and O’Connor illustrate that the economic geography of creative industries in Australia is spatially concentrated in particular regions and sectors of large cities and is highly unlikely to change significantly. They point out that planners and regional development practitioners need to reconsider the ability of lower-order places to have a successful knowledge-based urban development niche. In short, creative industry development as a subset of knowledge-based urban development is not a suitable development path for all places.

In the final chapter, Caroline Wong presents a conceptual approach to the knowledge-based economy that focuses on the developmental synergies between technology, culture, and place as expressed in the innovative and creative milieu of the city of Singapore. The chapter draws on research in the management of change as Singapore transits from a knowledge-based economy to a creative economy. Wong’s analysis of the knowledge-based economy suggests that competitive advantage is increasingly derived from investment in intangibles, particularly information and knowledge-based competencies. She focuses on the film industry as a microcosm-level of analysis to examine the state of the creative economy as the latest phase in Singapore’s economic development as technology and information are increasingly used to navigate and mediate its people, resources, and capital. The objective of this research focuses on examining the types of competencies that enable firms in the industry to stay competitive in the contemporary knowledge-based economy in the light of technological developments. In this chapter Wong seeks to shed light on what matters for the industry and the role that Singaporean government has in shaping the creative economy.

Section II: Knowledge-Based Urban Development Strategies
The five chapters in Section II provide insight into planning and policy strategies applicable to the successful implementation of knowledge-based urban development.

The chapter, by Mark Wilson and Kenneth Corey, “The alert model: a planning-practice process for planning knowledge-based urban and regional development” focuses on two related issues. First, the chapter draws attention to needed new planning processes to foster urban and regional development for knowledge-based development, and second, it raises the need to mobilize the strategic planning of effective intelligent development by the principal stakeholders of city-regions throughout the global knowledge economy. Continuing from the theme of the first section of the book, Wilson and Cary present a framework that allows routine planning practice to catch up with new economic realities. In particular,
they forge an understanding of the need for wider reconciliation between planning as an academic field, as a profession, and as an applied practice. In order for planning to embrace knowledge-based urban development, they argue for academic practitioner-planners to focus their efforts on the intersection of theoretical and basic urban and regional planning research, and empirical exploratory planning research and planning practice.

The next chapter in this section focuses on developing knowledge cities in Germany. In this chapter, Peter Franz questions the important role that universities have as a precondition for knowledge city development in Germany. Focusing on the role of institutional regulations, the chapter considers several case studies of the ways in which regulations and institutional specialties in Germany act as obstacles for choosing and implementing knowledge city strategies. Franz argues that, although clearly German university towns are potential sites for knowledge precincts to develop, impediments have acted to reduce this likely outcome.

The third chapter in Section II focuses on the Smart State initiative introduced by the Queensland State Government in Australia and places the Smart State Policy firmly within the framework of knowledge-based urban development. In this chapter, Tan Yigitcanlar and Koray Velibeyoglu start from the proposition that knowledge cites are complex entities and that attempts to transform cities into knowledge cities need to be guided by sound strategic visions, have broad social and political support, be financially viable and socially inclusive. It is within this framework that the authors consider the Queensland Government’s Smart State Policy and the Brisbane Smart City Policy finding that these policies, as represented by the State and Local governments, and in light of their early stage, has significant potential to move Brisbane to a globally competitive knowledge city.

The fourth chapter in Section II focuses on knowledge-based urban development in Barcelona, Spain, and in particular, the city of knowledge discourse that has become the official view of Barcelona’s urban planning policy. Outlining the main strands of the 22@bcn plan the chapter notes that, while this plan is clearly aligned with the city of knowledge discourse, the objective of the plan has been frustrated by the gaps between the expected outcomes and the social realities that have been developed. In discussing the Barcelona model, the authors, Anna Clua and Abel Albet, describe the paradoxes and problems that have faced Barcelona as the city has attempted to re-invent itself in the face of knowledge-based urban development. Their conclusion is that in Barcelona there is a clear imbalance between the strategic projection of the city of knowledge and the execution of this project through urban planning.

Sang-ho Lee, Jung Hoon Han, Yoon Taik Leem, and Tan Yigitcanlar’s chapter on ubiquitous cities presents argument for understanding the need for planning to give greater attention to the notions of ubiquitous cities. A ubiquitous city (or U-city) is about creating an urban environment where any citizen can get any service anywhere, anytime using ICT devices. Using a case study focused on the Republic of Korea, the authors argue that in an U-city significant benefits are likely to flow onto urban development and planning especially as the society moves toward full U-city maturity. The chapter provides examples of policy that has been introduced to move toward greater U-city presence. In particular, the authors discuss the link between the U-city developments and broader knowledge-based urban development dimensions and identify particular projects that have been aimed at such integration. The authors conclude by noting that the success of U-city strategies requires the collaboration across all interested stakeholders from national governments to local councils and private sector organizations.

Section III: Knowledge-Based City, Economy and Development
The third section of the book focuses on the links between knowledge-based cities and broader economic and development issues. The first chapter in Section III presents a case study of DNA Valley in the United States focusing on the difficulties facing the development of sustainable knowledge-based urban
development outcomes. Within the chapter, Edmund Zolnik argues that investments in pharmaceutical research and development have led to the emergence of a bio-technopole in the national capital region of the United States, and that the emergence of the private sector as a partner in big science programs such as the Human Genome Project has led to many innovations that foster and sustain knowledge-based urban development in DNA Valley. An important point made in the chapter regards the debate surrounding whether or not national and state restrictions on stem cell research put the United States at a competitive disadvantage in the global knowledge-based economy.

That is a big science in the 21st Century and is international in scope. Therefore, the best practices for knowledge-based urban development from biotechnology may not emanate only from the United States. In the end, international, interurban comparisons of knowledge-based urban development that acknowledge but do not focus solely on the role that government policy, both national and sub-national, plays in biotechnology will be more informative for policymakers.

Glenn Searle and Bill Pritchard’s chapter, “Beyond planning: Sydney’s knowledge sector development,” presents a grounded discussion exploring how knowledge-based urban development is generated with particular reference to cluster development. They ask two questions: What is the relative role of localization economies in generating different urban knowledge clusters? and How does this compare with the role of general urban agglomeration economies and can spatial planning activities promote such development? Searle and Pritchard answer these questions by considering the city of Sydney—Australia’s undisputed global city. In concert with the flavor of the arguments made by van Wezemael, they find that Sydney’s planners have been ill-prepared and confused by the tasks associated with optimizing knowledge-based development in the city. They suggest that rather than any carefully orchestrated approach the knowledge-based development that has occurred in Sydney has tended to be accidental. The approach they suggest for overcoming this accidental development approach is for planners to forge stronger relationships with private sector entities so that urban infrastructures can be allocated consistent with the needs of private sector investors.

In the third chapter of Section III, Willem van Winden and Luis Carvalho focus on the competitiveness and transition paths toward the knowledge economy of the two largest urban and economic concentrations in Portugal, Porto, and Lisbon. Using an integrative framework in which the competitive performance of urban areas is linked to sources explaining that performance, the chapter presents evidence of the significant economic performance differences that exist between the two regions, both in terms of business development and human capital development. Overall, Lisbon records more favorable outcomes, and the authors argue that this performance gap has widened in the last 10 years, with signs of dynamic and cumulative gaps between both urban regions. The chapter shows that business development and human capital development tend to reinforce each other, which is clearly visible in the agglomeration of Lisbon. Nevertheless, although education and qualifications have improved significantly in Porto’s urban region, there is an increasing mismatch between qualification’s supply and the business absorption. This situation is leading to increasingly qualified unemployment in the urban region and to the migration of the most qualified to other national and international urban regions. The chapter suggests that the different performance levels can be explained by differences in rooted structural assets (industry structure, knowledge base, quality of life accessibility, diversity), but also by the governance quality in both urban regions.

The fourth chapter in this section moves from Portugal to the Netherlands and focuses on production and consumption-oriented strategies in knowledge hubs using Delft as a case study. Using results of an analysis of the Delft Knowledge City policy, Anna Maria Fernandez-Maldonado and Arie Romein illustrate that Delft’s local strategy for urban development has focused on the production rather than the consumption aspects of knowledge hub development. This bias for (high-tech) production reflects the
economic policy’s main guidelines at the national level with The Netherlands aiming at improving its R&D and technology production sectors. Within the national picture, Delft is considered a good place to make this happen. At local level, Delft is doing everything to take advantage of this situation, with the assumption that a larger knowledge-based production will lead to a type of urban development that benefits all citizens. Undervaluing important aspects related to the city’s quality of place, Delft has insufficiently succeeded in integrating the knowledge sector within city life in general. Delft Knowledge City strategy still remains divorced from the urban worries of common citizens and the non-knowledge economic sector. Delft can permit itself this disregard to the consumption aspects of city life because of its favorable location; it borrows amenities, buzz, and residential environments from the nearby larger cities: The Hague and Rotterdam. But this situation does not contribute to a more sustainable urban development, since it is an obvious disadvantage for those residents who do not have the resources (in terms of money, time, health, social networks, or knowledge) to operate along larger urban networks.

The authors conclude that the case of Delft provides a useful illustration that the presence of a solid knowledge base is no guarantee for a sustainable type of urban development.

Section IV: Planning for Knowledge-Based Development

The final section of the book focuses attention on issues related to successful planning for knowledge-based development. The first chapter of Section IV provides insight into knowledge cities of the Middle East. Rather than concentrating solely on a single city, Ali Alraouf focuses on several case study cities in an attempt to explore the knowledge city concept in depth and relate it to the ongoing process of creating knowledge-based economic developments in major Middle Eastern cities. By doing so, he discusses the principles of a knowledge city, and portrays its distinguishing characteristics and processes, and attempts to foster this concept in today’s Middle Eastern cities. The chapter introduces the concept of urban creativity engines in relation to the Middle East context, and provides examples of how this concept in relation to Middle Eastern cities provides a useful framework with which to construct and evaluate knowledge cities.

The second chapter in this section focuses on a case study in Australia. In Phillip Daffara’s chapter, the focus is on the development of a knowledge town using Sippy Downs as a case study and considering the impact of planning/urban design practice, as enacted at the local level by key stakeholders. The context for the chapter is the design and creation of a new master-planned community with a focus on knowledge-based urban development, and Daffara uses this context to assess the degree to which normative urban/regional planning as applied on the Sunshine Coast is effectively responding to the desire for a new town and its business activity centre, based on the global knowledge economy. The elements that have succeeded in Sippy Downs are based on the accumulative effect of successive master planning studies from 1994 to 2006, allowing a shared vision to be built among stakeholders for the university town, within a context of rapid population growth and changing infrastructure demand. Through the design principles and participation processes of New Urbanism, local community knowledge was generated to shape the vision and plan for a regional knowledge hub. What clearly did not occur in Sippy Downs was the consistent delivery of proactive, collaborative, and coordinated public-private partnerships to implement the vision and master plan. This must be remedied if the town is to succeed in establishing itself as a knowledge hub. To achieve that end, this analysis has provided future directions for improving the place management and governance of the town’s development. It also has proposed future development opportunities that can culturally converge Sippy Down’s local place experience with the power of global knowledge/information networks.

The final chapter in this section is by Bhishna Bajracharya and Janelle Allison and explores the role of ICTs in the development of knowledge-based master-planned communities. In particular, the chapter
focuses on an exploratory study on how ICTs have been adopted in master planned communities of South East Queensland, Australia. The chapter considers four roles of ICT in the master planned communities, including teleworking; creating a sense of community; promoting integrated office and businesses; and developing learning communities; and it provides specific case study material relating to selected sites in South East Queensland. Specifically the chapter highlights how many of the newer master planned communities now incorporate work and learning spaces in the mix of land uses, thereby encouraging the development of knowledge communities. In short, the authors argue that the integration of ICTs can play a positive role in the development of knowledge-based master planned communities with a focus on living, working, learning, and playing.
Section I
Urban Development and Knowledge Environment
Chapter I
Knowledge Creation in Urban and Knowledge Environment

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ABSTRACT

Today, knowledge is addressed as a key driver in urban development. From an urban planner’s perspective, however, it seems that the knowledge we talk about is out there in so-called knowledge industries. Knowledge-based urban development refers to development of city regions that are more or less driven by the knowledge economy, or to opportunities to attract knowledge workers in order to fuel economic growth in specific areas. The aim of this chapter is conceptualizing what knowledge and learning mean to, and in, contemporary planning praxis. The chapter discusses the key concepts of knowing and their relation to doing. By mooting a theory of assemblages, the chapter further provides a foundation for the analysis and the enforcement of learning in urban development praxis. Drawing on research on learning organizations, this chapter provides a basis for the contribution of urban planning to knowledge-based urban development.

INTRODUCTION

There are several ways of treating anomalies. Negatively we can ignore, just not perceive them, or perceiving them we can condemn. Positively we can deliberately confront the anomaly and try to create a new pattern in which it has a place (Douglas, 1966, Purity and Danger).

The world is changing in ways that happen rarely (Landry, 2000). Knowledge is said to play a key role in these changes both as a driver of change (as in the knowledge economy (Drucker, 1993) or in the form of ICT-based expert systems) and as an answer to them. However, knowledge as a term or a concept also is in danger of becoming an unproblematic theoretical passe-partout (Ibert,
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2007), which is uncritically taken for granted and theoretically underdetermined. As Law and Urry (2004) argue, social and physical changes in the world need to be paralleled by changes in the methods of social enquiry, which means by the ways we know (epistemology) and by our concepts of reality (ontology). Whereas the linear categories of social science—often referred to as Euclidian—in general, and in urban sciences in particular, were more or less productive in the 19th and early 20th century, they are less productive of global realities at the beginning of the 21st century, a world that enacts itself to produce unstable what accounts for proper knowledge in an increasingly high pace, and that calls for more adaptive and generative organizations in both economy and administration. The experience of insufficient concepts also is echoed from practice, where a linear or modernist worldview is faced with a variety of anomalies: identical interventions in allegedly similar situations produce very different results. The application of traditional tools in urban planning does not meet up with the increasing complexity in urban development. It becomes clear that in order to address knowledge in 21st century urban development we must be able to deal with social complexity. Before the background of severe insufficiencies, urban development was confronted basically with two strategies: (1) systems reforms, and (2) calls for creativity and experimentation.

1. It seems wherever you turn in the world, governments are reviewing the performance of their planning systems and in many cases introducing substantial packages of reforms (Campbell, 2003) on the national level, but also on lower scales. However, as evaluative analysis shows, mere structural reforms may miss the problem and produce dissatisfying situations (Campbell, 2003; Crawford, 2003; Harrison, 2003; Hillier, 2006; Suh, 2003; Van Wezemael, 2006c). Rather, the lack of knowledge creation in spatial planning practice has been found the reason that spatial planning is conceived not as a force for positive transformation but rather as an inhibitor of change and constraint on innovation (Campbell, 2003). Thus, as Suh (2003) points out, the success of reforms depends on “planners rapidly scaling a considerable learning curve,” and, therefore, “the main task for the planning community is to develop new skills” (Campbell, 2003).

2. The widely acknowledged failure of modernist decision-making (Tewdwr-Jones, 2002) is met with a call for creativity. Recent developments in planning theory reflect the changing conditions for decision-making and emphasize the importance of experimentation (Forester, 2004; Healey, 2003, 2004a, 2004b, 2004c, 2006a; Innes & Booher, 2004). Healey (2004a) suggests that some modes of governance may restrict creativity in evolutions and of the management of collective problems of urban existence; others may help to release creative energy. She thus indicates different qualities of learning environments in the organization of urban development praxis. Although these authors suggest that there is a lack of performative knowledge, there are hardly any contributions to the question what kind of knowledge is needed, how it is produced, where the locus of its production is, and how planning as an organization can manage and improve its generation.

Thus, both strategies lead to the bottom line that traditional approaches to knowledge are inadequate and call for a learning curve of planners and for the creation of new (performative) skills. However, the given picture of spatial planning as an inhibitor of change and constraint on innova-
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Knowledge creation sharply conflicts with the wishful rhetoric of planning as a site of knowledge creation and creativity. Whereas innovation and knowledge creation is a constitutive topic in economic contexts where it relates to competitive advantages, learning organizations and organizational learning, in urban development it only recently stems from the challenge of coping with institutional change and relational urban conditions.

However, there has been significant organizational change, too. With the rise of complex urban governance structures and in the aftermath of new public management initiatives urban development increasingly takes place in a project ecology (Grabher, 2004): Individuals temporary plug into a project team with members of other public and private organizations as well as parts of the civil society and the economy and thereby form heterogeneous assemblages. This chapter aims at pushing the debate on knowledge creation into the arena it belongs: right at the center of the major challenges on urban futures. Although it cannot be the objective of this chapter to fully elaborate a theory on knowledge creation in urban development, I aim at triggering a debate on this hitherto neglected but crucial field of research and praxis in the field of (knowledge-based) urban development. In the first section I embed the issue in the fields of urban complexity and ecologies of knowledge creation. After a brief inquiry into knowledge the main part addresses the necessary shift towards a non-linear understanding of urban decision-making and moots the theory of assemblages as a foundation for the analysis of learning in contemporary urban development practice. The next section discusses an approach to knowledge creation with a learning organization model from organization studies on the basis of the perspective as developed in the chapter. The conclusion reviews the lessons to learn and points in the direction of future development.

BACKGROUND: CONCEPTS AND ISSUES

Urban Complexity and Decision-Making

The call for knowledge creation and reforms in urban development stems from the growing awareness that modernist modes of decision-making do not meet the complexity of urban realities in the 21st century (Law & Urry, 2004). This becomes eminently clear in the fields of urban planning, to which this chapter mainly refers. So as to embed the discovery of complexity in urban decision-making it can be related to the relational turn in planning and urban geography and to the rise of (urban) governance:

Literature refers to the production of places as complex layering of multiple networks as the relational turn in urban geography and planning (Amin, 2002, 2004; Healey, 2006b, forthcoming; Massey, 2005; Thrift, 1996; Thrift, 2000). A relational perspective views cities and regions as agglomerations of heterogeneity that are “locked into a multitude of relational networks of varying geographical reach” (Amin, 2004). The multiple determination of spatial systems implies that the basic assumption of technocratic knowledge—same causes, same effects—no longer applies.

Since the 1980s there has been a vast shift from hierarchic government-based modes of urban decision-making with command logic to heterarchic governance network-based modes with negotiation logic. Negotiations in urban governance are directed, for example, to the realization of a joint product such as a city plan or a strategy of collective action (Mayntz, 1993). According to Jessop (1999), the discovery of governance reflects the intensification of societal complexity that flows from growing functional differentiation of insti-
tutional orders within an increasingly global society. This functional differentiation undermines the basis for hierarchical, top-down coordination under the aegis of a single centre, such as the state and its (planning) institutions.\(^2\)

The debates about network governance tend to veil that the state is not abandoned but rather is transformed (Tang, 2005). The blurred boundaries of the planning organization in governance contexts and community involvement, and the increasing project logic in urban decision-making define the environment for knowledge-creation strategies.

**Innovation and Knowledge Creation**

In a modernist perspective, planners disposed of allegedly neutral knowledge, which is given by logic and applied throughout different situations (Campbell & Fainstein, 1996). The locus of knowledge creation and its application are neatly separated. Although this ideal type of technocratic planning hardly existed in pure form, the recent rise of a project ecology in urban governance arenas highlights the shift of the locus of knowledge creation from an institutional framework to knowledge creation in the context of practice (Gibbons et al., 1994). Grabher (2004) illuminates the *temporary architecture of learning* in project ecologies, and he stresses the potentials of such a mode of knowledge governance: “Through their trans-disciplinarity and transience, projects [...] indeed appear as most pertinent form for creating knowledge in the context of application” (Grabher, 2004). The potential of project-learning stems from the interaction of heterogeneous skills, experiences from different backgrounds, traditions, attitudes, and so forth, which may create something new and unexpected by triggering novel and unexpected confrontations of different perspectives. By disentangling the *layers* of the core team, the firm, the epistemic community and the personal networks, Grabher (2004) highlights the multi-level complexity of project-related learning processes. However, the relations of those layers and their ontological status must yet be clarified (see below).

Organization Studies have been developing a large body of concepts in the field of individual and collective learning. Concepts such as knowledge-management (Shan & Scarbrough, 1999), organizational learning (Brown & Duguid, 1991; Cavalieri & Fearon, 2000; Wenger & Snyder, 2000), knowledge creation (Rynes et al., 2001; Schön, 1995), or learning organization (Senge, 1990) gained a lot of attention since the early 1990s. Knowledge-management programs attempt to manage the process of creation, accumulation, and application of knowledge across an organization. While they are closely related to organizational learning initiatives, knowledge-management may be distinguished from organizational learning by a greater focus on specific knowledge assets and the development and cultivation of the channels through which knowledge flows. Since organizations increasingly need to be more adaptable to change, the concept of a learning organization is increasingly becoming popular in business economics and management. *Learning* emphasizes the continually changing nature of organizations. Since individuals form the bulk of the organization, they must establish the necessary forms and processes to enable organizational learning in order to facilitate change. This is meant by *mindset change* in individuals as a necessary process in organizational learning. In the field of planning system’s change, this has been associated with a *culture change*, too (ODPM, 2006).

Knowledge creation has been widely recognized to be strategically important for organizational learning and innovation. Nonaka and Takeuchi (Nonaka & Takeuchi, 1995) crystallized the intricacy of knowledge creation and its importance in the organization’s long-term success and survival. Further development focused on how firms can generate and nurture ideas by using Nonaka and Takeuchi’s concepts. Studies mainly regard aspects of the overall knowledge-
creation process, such as inter-organizational knowledge transfer, knowledge flows within the firms, and the interplay of tacit and explicit knowledge. Recently some authors (Chia, 1999, 2003; Cooper & Law, 1995; Jedema et al., 2005; Tsoukas, 1998; Tsoukas & Chia, 2002) draw on process philosophy (Bergson, 1946; Whitehead, 1933) and on poststructuralist thinking in order to move beyond the *stage-model of change*, which reduces change to a shifting between stable states (Lewin, 1951).

As research on project ecologies and organizational learning processes show, a learning process may occur by interrelating heterogeneous knowledgeabilities, which become meaningful by means of referring to the particular project task. However, since the temporality of projects implies the risk of *organizational amnesia*, the interweaving of newly developed practices and existing organizational modes are paramount for systematic knowledge creation in the context of practice. The major challenge for knowledge creation in urban development organizations, therefore, is to develop multi-level learning strategies.

Although the field of urban development is populated with project ecologies, they hardly are viewed, not to mention strategically treated, as sites of knowledge-production. For example, the far-reaching planning reforms in England and Wales introduce governance-related project ecologies without producing any strategy for knowledge creation. Instead of drawing on distinct skills and competences, which have to be developed actively, the responsible government agency relates implementation problems to a fuzzy concept of *culture change* (ODPM, 2006). This is one reason why an organizational project-capability is lacking. Governance landscapes thus challenge hitherto practices and *stocks of knowledge*, but they also provide a potential learning environment in the context of practice.

The hitherto argument implicitly constructed a close relation between knowledge, skills, and practice. The following sections make clear that there are different traditions of knowing that relate differently to practice and to various loci of knowledge creation.

### Forms of Knowledge

Usually the terms *data, information, and knowledge* are related in a hierarchy toward more complexity and context-sensibility. Whereas information can be referred to as data in relations or data “information”, Shields argues that knowledge is an open process of translating information between contexts and remaking it. Unlike information that can be stored, knowledge has to be transformed in order to be maintained. This transformation takes place in practice; therefore, the changing modes of knowledge in practice must be theorized. Polanyi (1966) suggests that we start from a tacit mode of knowing, and that all explicit knowledge is based on the former. Interestingly this distinction has mostly been interpreted as two distinct modes of knowledge—giving the explicit the objectified status of a discrete entity and thus a realm of its own—rather than a relational and performative account of only analytically discernable ideal types. However, this can be explained, by referring to the main intellectual traditions toward knowledge. These traditions refer to different ontological and epistemic assumptions, and they imply diverging relations between the self, knowledge, performance, and knowledge creation.

In Euro-American modernism, there is a strong bias against embodied skills, tacit knowing, and experience in favor of abstracted supervisory (explicit) knowledge (Shields, n.d.). Whereas tacit knowing always has a subjective, social, contextual account—therefore different knowing from various practices are not expected to produce one coherent set of knowledge (see Latour, 1987)—explicit knowledge is mostly understood as a linguistic mirror of an objectively given world, which can be discovered and then represented or at least step-by-step approached (Chia, 2003).
Whereas organization studies rediscover the tacit as a main focus in knowledge creation and improvisation in the context of its application (Barrett, 1998; Chia, 2003; Cunha et al., 1999; Kamche & Cunha, 2004; Weick, 1998), the representational tradition is inter alia fuelled by the possibilities and requirements of ICT systems (not least in urban contexts and GIS technology, see Sieber, 2006). The following sections discuss and contextualize the two ideal types of explicit and tacit knowledge, and conclude that the relevant question is how to productively mesh various aspects of knowing in learning processes.

**Explicit Knowledge**

_Savoir pour prévoir et prévoir pour pouvoir_ [Know to envisage and envisage to be able.] Auguste Comte

Explicit knowledge generally has been emphasized in Taylorist production (temporal and spatial detachment of scientific planning from implementation) and modernist planning (Van Wezemael, 2006c). It is the dominating position in defining knowledge in Euro-American modernism. Chia (1999) explains that theorizing within the natural and social sciences is largely circumscribed by a metaphysical mind-set that tacitly presupposes the necessary existence of enduring spacio-temporal and physical forms of order underlying the presentation of reality. Explicit knowledge can be represented in words and numbers, and can be easily shared in the form of information and propositional knowledge (Tsoukas, 1998). Ontologically it is founded on the _metaphysics of substance_, which draws from the intellectual tradition from the pre-Socratic atomists Democritus and Epicurus (Guthrie, 1979), Plato and Aristotle (Taylor, 2001), Descartes (Grayling, 2005; Locke, 2004). Crucially, the _social physics_ of Comte (Pickering, 1993) and the work of Spencer (Kennedy, 1978) cemented this metaphysical perspective, which has been successful in classical mechanics, in the social sciences. Epistemically this form of knowledge is based on the representationalist tradition, which was advocated in an Aristotelian tradition by Descartes and Locke in the 17th century. Aristotle tended to take the articulated language as the only real route to knowledge (Chia, 2003). Chia (1997) argues that on this basis our deeply ingrained habits of thought elevate notions of permanence, stability, and endurance over transience, flux, and transformation. What does this mean regarding the relation of the self, knowledge, and performance?

If to know means to be able to say precisely what a thing is, this means giving it an fixed identity, which is then located in a linear system of causal relations (Chia, 2003). This Cartesian idea of the _self_ implies that the self is independent from its experience and thus that it does not change with changing knowledge. Documented knowledge necessarily precedes and hence determines action and performance; therefore, the substantive fixation of _facts_ in the form of representational knowledge forms the pre-condition and basis for action. The loci of (science-driven) knowledge-production and its application are to be (spatially and timely) separated.

**Tacit Knowing**

_Symbols are to express ideas. When ideas have been understood, symbols should be forgotten. Words are to interpret thoughts. When thoughts have been absorbed, words stop . . . Only those who can take the fish and forget the net are worthy to seek the truth_ (Kao-seng Cuan, cited in Chang, 1963).

As one can relate the favor for explicit knowledge to the West, one may stress out a deep doubt against it in Eastern traditions. The latter view knowledge primarily as being tacit, not easily visible and expressible, highly personal, and hard to formalize (Nonaka & Konno, 1998). Tacit knowl-
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Knowledge is “deeply rooted in an individual’s action and experience as well as in the ideals, values, or emotions he or she embraces” (Nonaka & Konno, 1998). It includes a cognitive dimension, which consists of beliefs, ideals, values, schemata, and mental models. However, this mindset also is related to a historically largely suppressed Western intellectual tradition, which leads us back to Heraclitus, and which includes, for example, the work of Leibniz (1953), Bergson (1946, 1921, 1998), the pragmatists Dewey (1966) and James (1996), the philosophical work of Whitehead (1929, 1938, 1933, 1967), the process philosophy of Nishida (1958, 1990), and that finds its so far fullest elaboration and expression in the work of Deleuze (1991, 1992, 1994; Deleuze & Guattari, 1983, 1987, 1994; Deleuze & Parnet, 2002). What does this tacit perspective imply for the relation of the self, knowledge, and performance?

As Nishida (1921, 1990) argues, it is not experience that exists because there is a self, but there is an individual because there is experience. Therefore, what a thing consists in what it does (Rescher, 2002), and as a result knowing “is in our action” (Schön, 1983, p. 46, cited in Ibert, 2007). The embeddedness into practice points out that knowing refers to a collective dimension. Being part of a team or a community of practice embeds performance and thus knowing.

This very brief inquiry into the orthodox differentiation of knowledge makes clear that tacit knowing is closely related to practice, whereas, explicit knowledge refers to the modernist design of top-down knowledge application and detaches knowledge creation from the locus of its application. However, this analytical distinction is not sufficient to understand the creation of knowledge in the context of practice as a learning environment. In a relational view, the key question is: how are these kinds of knowledge related in a context of urban knowledge creation, foremost in a project ecology.

LEARNING AND HETEROGENEITY

As we can learn from the analysis of project ecologies (Grabher, 2004), geographies of knowledge creation (Ibert, 2007), or from science and technology studies (Latour, 1987), learning processes are fuelled by the connection of heterogeneous elements (practices that belong to different places or to different projects or organizations) and—given a learning environment—from the encounter with novel and unexpected processes or anomalies.

Thus, pieces of data and information from previous work, elements of knowledgeability from different practices, individual beliefs and experiences, collective narratives, guidelines from various organizations (e.g., in urban governance settings), meshworks of hardware (e.g., computer and other infrastructure), and also specific software and ICT network-designs form heterogeneous assemblages. Given the general importance of heterogeneous settings in learning processes and the specific organizational aspect of project ecologies (in urban governance), Manuel Delanda’s (2006b) critique of the micro-, meso-, and macro-reductionism of social sciences and their inability to adequately deal with intermediate entities obtains major relevance in the context of this chapter. He states that “the ontological status” of various scales, which are neither micro nor macro—such as project teams, peers, organization segments, organizations, cities—“has not been properly conceptualized” (DeLanda, 2006b). He claims that scientists that deal with these intermediate levels “without ontological foundations […] are typically using an implicit and thereby uncritically accepted ontology” (DeLanda, 2006b). In order to avoid this pitfall and to provide a framework to conceptualize knowledge production in contemporary complexity settings, where small differences may well matter, the following section will moot assemblage theory as a
framework for further research. In order to meet the goals in this chapter, it has to conceptualize or frame the project ecology in urban governance and planning contexts in the early 21st century, and on this basis address knowledge creation.

THE ILLUSION OF LINEARITY

Basic concepts such as structure, both in the natural and social sciences, ground determination within a logic of stability and linear causality. There is a widespread experience in urban development and related fields that (e.g., the application of identical sets of knowledge in participation projects or meta-governance) produces very different outcomes, although the conditions seem to be similar. We may call this the disillusion of best practice approaches (which is the illusion to know what is best without really knowing the problem, see below). This means that the mere application of codified knowledge (e.g., in the form of given planning instruments) tend to fail under conditions of complexity. Whereas these experiences are anomalies from the point of view of linear causality, they are not from the perspective of non-linear causality, where small differences may trigger major changes, and where problems allow multiple actualizations or solutions. However, this non-linear perspective calls for a more experimentalist approach to knowledge, where the distribution of the important and thus the proper problem piecewise emerges in local situations. In a linear worldview, small causes produce small-scale effects (and vice versa), and the same cause (always and everywhere) produces the same effect (DeLanda, 2006b). Non-linearity on the other hand makes the assumptions that there is no necessary proportionality between causes and effects; the individual and statistical levels of analysis are not equivalent; and system effects do not result from the simple addition of individual components (Law & Urry, 2004). We thus create a new pattern in which anomalies may have a place.

Classical mechanics is the often forgotten role model for social sciences and the godfather of many concepts and much of their thinking. As we know today, it only dealt with unlikely special cases (see DeLanda, 2002). Therefore, the belief that the world around us generally behaves similar to those special (linear) cases can be referred to as the illusion of linearity. In order to adequately conceptualize learning in conditions of social complexity, we must introduce a different ontological basis and thus develop a different research perspective. This perspective emphasizes co-articulation and compossibility rather than linear determination, and the temporality of processes stresses emergence and the irreversibility of processes. It lays ground for an adequate conceptualization of creativity in urban development. On the basis of the previous arguments, a framework for adequate knowledge creation in urban development must conceptualize learning processes on the various levels (e.g., Grabher’s (2004) constitutive layers); address the relations of the loci of knowledge creation, theorize movement, transformation, and storage of knowledge in a relational context; and provide a sound ontological basis for this multi-layer architecture.

THEORY OF ASSEMBLAGES

Imagine: An individual person, a population of individual persons, project-teams, organizations, inter-organizational networks, community networks, or cities do not differ in ontological status; they are all historically produced individuals, which work on different spatial scales (or different layers), and which are produced by connections on the next lower scale. The parts—such as a subject or a project team—would not dissolve into the next scale, such as the project team or the organization.
They can unplug from one entity (e.g., the subject from a project team) and connect to parts of another entity (such as a family or a sports club or another project-team) without changing their constitutive elements. Thus, relations may change without the terms changing. The scales are not self-referring, essential entities, but rather are statistical results from the connections on the lower scale. Which one is part and which one is whole consequently is a solely relative question. The question—what a thing is (its essence)—would be replaced by the question—what a thing does. The production of an entity—the stabilizing and destabilizing processes of this always precarious thing—become active for new and different connections and for (immanent) change. An assemblage can refer to the processes of production (de-stabilization and re-stabilization); the second one refers to the question what it can do, which role it can play (for further elaboration see DeLanda, 2006a, 2006b; Van Wezemael, 2006a).

In an assemblage perspective, knowledge-production can be viewed as an event, which stems from an encounter with the other. The next section will theorize this encounter and the paradox task of learning, which at the same time refers to organizing coherence and irritation (Ibert, 2007).

**LEARNING ASSEMBLAGES FOR KNOWLEDGE CREATION**

If knowing is in doing, then what an assemblage—such as a person, a project team, or an organization—can do refers to its knowing. Since the parts of assemblages in this theory also are assemblages, which work at a lower scale, organizational knowing is located on various intermediate scales. It is produced by means of specific connections of parts. Why are knowings clearly associated with the scales of the assemblages? One consequence of non-linear dynamics is that any population (e.g., of humans, organizations, or networks) will exhibit emergent properties, that is, properties of the population as a whole, which are not displayed by its individual members (DeLanda, 2006b). Therefore, what an assemblage can do refers to its knowing and is an emergent property of its respective scale. With other words, the connections that form an assemblage generate a knowing that exceeds its parts. Collective knowing thus emerges from the connections at one scale (e.g., subjects in project teams) and therefore is an emergent property of the next larger scale (e.g., project teams). The components become part of the knowledge they produce. Knowing thus “cannot any longer be attributed to the knower, who participates in a further stage of becoming not reducible to his knowledge” (Phillips, 2006). It is like the becoming of a poisoned body, which cannot be reduced to the body or the poison, but refers to the event of their encounter. By entering into heterogeneous relations of becoming, the human is always already other than itself. The knowing that is always lies in-between, in the connection.

Since an assemblage is a statistical product of the lower-scale-connections, rather than an
essentialist entity, its properties are not given. They are merely possible when not displayed. Thus, a real assemblage on the one side refers to a virtual space of possibilities, on the other side it refers to its actual form. Since an assemblage perspective is interested in the production of things rather than in their being, it characterizes the assemblage by different kinds of lines that refer to its virtual and the actual side. We can think of the assemblage as characterized by major and minor lines on the actual side and by virtual lines of flight in the space of possibilities (Van Wezemael, 2006a).

On the axis of what the actual assemblage can do, major and minor lines structure forms of knowing. Major and minor are relative terms—relative to each other (Deleuze & Guattari, 1987). Whereas the major would define a standard of knowing (the way something is done correctly, for example, in a project team), the minor lines would be deviating lines, which relatively de- and re-stabilize the standard without changing its character as a standard. Often this major knowing is stored in the form of stories and anecdotes about heroic episodes or tragedies (Grabher, 2004). However, they relatively change every time they are re-told since they always connect to specific situations and are told by specific persons (remember that in a non-linear perspective the individual and statistical levels are not equivalent). This refers to the minor, which is more fluid in its principles of organization, playing around the major lines. The minor spins around the major; deviating practices spin around the current modes; alternative interpretations spin around the orthodox ones. The major lines are restrictive to the minor knowing. Whereas, the major modes of knowledge stabilize an assemblage and may develop identity-functions, minor forms of knowing constantly challenge the standard and introduce intrinsic change. A productive abrasion between the major and the minor defines a potential for continual knowledge creation, and spans a field between consistency and the unexpected. However, events that fundamentally annul the standard are theorized with lines of flight, which discontinuously rupture the major and minor lines. In their effect, they introduce, for example, other stories to be retold and then relatively changed (see above).

In concrete situations knowing in an assemblage is sustained by interactive stabilizations that are situated in a heterogeneous space of social actors, conceptual structures, official knowledge (in anecdotes or formal guides), and disciplined practices, minor practices, ICT systems, and so forth. At the same time, the emerging knowing is part of this assemblage since it acts both as a source of resources and as a potential future limitation for its components. On this basis, we finally are able to conceptualize experimentation and move well beyond the normative claims and wishful thinking in planning literature (see above). Every problem, such as an urban regeneration project, means a new assemblage of heterogeneous parts that have not been connected before. Heterogeneous elements connect similarly, as we have discussed in regard to project ecologies. They will behave at first in an unpredictable way just as the set-up of a new experiment in a laboratory moves beyond hitherto experience. Prior to their being solved, such experimental problems must first be embodied in an intensive assemblage with a yet unknown (virtual) distribution of the important, and where multiple solutions are possible. For example, in urban regeneration it may be necessary to interfere and de-stabilize given connections in order to piecewise discover the distribution of the relevant: representations of an area can be challenged by multiple alternative representations; institutionalized community groups by addressing the population in alternative ways and the like (Van Wezemael, 2006b). The planner as an experimentalist can only progressively discern what is relevant and what is not in
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a given task or project. The singular distribution of the important and the unimportant, which ultimately defines the problem, cannot be grasped at a glance the way one is supposed to grasp a clear and distinct idea, but only slowly brought to light as the assemblage of heterogeneous components stabilizes itself through the mutual accommodation of its heterogeneous components.

There are always formal products of planning practices, such as individual pieces of data, individual facts, and individual solutions. Once detached from their intensive individuation-context where the experimental learning takes place, these individual items of knowledge become significant only by reference to a theoretical framework of laws and abstract concepts. When solutions become detached from their problems, they tend to subordinate the problem. However, in non-linear perspectives, solutions are only temporary fixations. While rigid habits may be enough to associate linear causes and their constant effects, they are not enough to deal with non-linear causes that demand more adaptive, flexible skills (DeLanda, 2006b). If we assume that there is always a unique stable state, or that a cause always produces one and the same effect, we may forget about the problem and focus on the solution as the constant regularity itself as described by law. This would mean to switch back to a linear understanding, and it would make it impossible to trigger and harvest continual learning in social assemblages and thus to provide a real foundation for knowledge-based urban development. What makes a problem problematic and continuously demands new explanations is precisely the openness-endedness of the assemblages it may form, or the multiple stable states in which it may exist and the abrupt transitions it may undergo.

In this assemblage perspective, knowledge creation always takes place in-between: in the productive tension of the minor and the major, in the connection between (heterogeneous) components, such as at the interface of planners and community-members, or of members with different backgrounds in planning project teams. Or more fundamentally, between the predominance of one heroic or tragic story and the next one.

BUILDING A FOUNDATION FOR KNOWLEDGE CREATION

As mentioned earlier, the understanding that knowledge creation in the social context of practice is one strategy to meet the complexity of fluxing environments is much more established in the context of economy and nearly completely lacks in fields such as planning studies. In the field of learning organizations, Nonaka and Takeuchi (1995), and Nonaka and Konno (1998) introduce a concept for “a foundation for knowledge creation” in economic organizations, from which we might gain key ideas in order to introduce learning in urban development practice. Their concept embraces, first, a metaphorical dimension by introducing a shared narrative (as a major line). They take the concept of “Ba” from the philosophy of Nishida (1921, 1990, 1958), which might be translated with the word place. It is to make a difference to the way practitioners position their selves in relation to the others and to the larger system of knowledge creation by giving them a place for knowledge creation. This integrating conceptual metaphor is important in order to legitimate the change of habits, such as the courage it takes to deviate from locked-in traditions, to improvise and experiment or to destabilize an unquestioned routine. Second, they suggest creating an organizational design that mirrors such places on different scales of the organization and introduce a concept to link these places by means of a successive spiral connection that moves up and then down the organization. The many reforms in local, regional, and national planning systems may be informed by the conception of places for knowledge creation.

Nonaka and Konno (1998) start with a (1) socialization phase, where peers directly share
tacit knowledge in practice. In the following, (2) externalization phase this knowledge becomes more explicit (narratives, etc.) and is shared with the team. The sharing of the team’s knowing with the organization occurs in the (3) combination phase, where codification of knowledge reaches a maximum. In the last phase of the spiral model, subjects (4) internalize the new concepts by means of learning by doing and using. Since Nonaka and Konno base their concept on phenomenology and use a dualistic understanding of tacit versus codified knowledge, their innovative idea must be re-thought and refined on the basis of the arguments in this chapter.

From an assemblage perspective, Ba may be translated with intensity. Nonaka and Konno point out that Ba differs from other interactions in the goal of knowledge creation. Similarly an intensive assemblage differs from a less intensive one by displaying real learning (see above). The introduction of Ba as a metaphor ought to legitimize de-stabilization (e.g., in community involvement) and open up different/many trajectories to temporary and individual solutions.

In learning assemblages, there are always pieces of ready-made concepts or individual sets of data, which in practice become parts of a specific assemblage by means of specific connections. Whereas Nonaka and Konno argue that codification of knowledge increases from externalization to combination phase, and then decreases in internalization phase, an assemblage approach finds the heterogeneous elements everywhere but stresses importance to re-connect them in an intensive assemblage rather than taking them as given solutions. Since they are acting as resource, respectively as constraint8 (see above), the connections in organizational learning run horizontally on the level of connecting parts as well as vertically between the scales. The stabilizing modularization of learned capacities conflicts with the destabilizing strategy of an imperative of originality (see Grabher, 2004). Unlike the concept of Ba, in an assemblage approach codified knowledge is never separated from practice. It does not exist in a praxis sense without specifically being connected and related to an individual, historical assemblage.

When it comes to learning-strategies, the crucial aspect is that they may be connected differently and so produce other, new, unexpected assemblages with other capacities—and thus other knowing. To keep up learning processes in urban planning organizations means to fuel processes that produce intensive assemblages. Ambivalence and the simultaneous potential to realize various temporary solutions must become a key element of process design and, for example, by means of shared narratives, of the self-conceptions throughout the assemblages of urban development.

The view of an assemblage approach on knowledge creation can—besides the important shared narratives and metaphors—inform the design of organizational learning. Take as an example one place of knowledge creation, which is particularly important in the approach of Nonaka and Konno (1998), and Nonaka and Takeuchi (1995). They stress out the weight of one place—cyber Ba—where new concepts from the team level are combined and elaborated. They ascribe a vital role to a virtual forum. Rather than employing experts, which homogenize the various concepts that stem from intensive encounters, (as Nonaka and Konno (1998) suggest), cyber Ba itself can be designed on the basis of what we learned about intensity. An assemblage perspective highlights the interdependencies between opportunities of a virtual forum and other components of an assemblage, such as specific social practices (hitherto addressed by minor and major knowing). Thus, if cyber Ba is to trigger innovation, then conflict and the ambivalence of divers and non-coherent representations must have a place in the design of virtual environments, too. One straightforward way to achieve this is to avoid the dependency on only a single virtual environment—simultaneous
access to different virtual forums fuels intensity and thus makes learning processes more likely (Grabher & Maintz, 2006).

**CONCLUSION**

In this chapter we have tried to develop the argument that knowledge creation in the context of practice is one strategy for urban development in order to meet the complexity of fluxing environments as theorized in relational urban geography. However, an inquiry into knowing and practice points out that the existing knowledge-gap must be met with a strategy of organizational learning and knowledge creation in urban development. The growing awareness that we are dealing with (urban) realities that do not behave in a linear sense challenges a number of those very conceptions we have learned to take for granted in traditional (social) sciences and also in the professional training as planners. It is, therefore, particularly important not to trivialize the term knowing or uncritically accept common-sense definitions. Assemblage theory provides an adequate framework for analysis and further theory building. But, it also allows drawing out some very practical conclusions on the basis of the theoretical argument. The benefit of having the argument is that we now can provide a foundation and thus are able to move well beyond the normative calls for creativity and experimentation in urban planning.

The blurred boundaries between professional planners and their urban governance counterparts (e.g., in knowledge industries or neighborhood organizations) as well as the associated rise of project ecologies define the challenging environment for knowledge-creation strategies. Therefore, process and organizations design must be informed by an adequate conceptualization of these conditions. The mooted assemblage-approach meets this demand and it can help to set up learning environments by triggering intensive assemblages in praxis.

This can start from some basic rules of thumb. Like in a laboratory experiment planners must approach a project with the awareness not to know where it will end, and they will need a shared narrative in order to do so (remember the metaphoric use of Ba). The encounter with the Other can be cultivated as an event by means of shared narratives of past adventurous experimentations on the edge of the (unk)nown. Therefore, uncritical best-practice orientations are the enemy of individual and collective learning and knowledge creation in the context of planning practice. If in a design study you switch from CAD to foam plastic models and back, you do not just change the actual setting of planning as experimentation. Rather, you also create different spaces of possibility and becoming. Such potentialities for novelty are triggered when you combine various modes of representation in the planning office as a laboratory of the city. The following issues may help realizing more intensive learning environments in everyday procedures:

- Try to use the conjunction and instead of either-or when dealing with sets of representations or with the choice of planning tools. The procedures of decision-making best are designed in order to maintain heterogeneity and multiplicity of representations as long as possible. Work with several expert systems simultaneously, use GIS tools and representations, for example, by schoolchildren in one and the same neighborhood discussion forum. Use various virtual environments, run applications in parallel mode, and switch between them regularly. Mix IT-skeptics with enthusiasts in working groups. Try cutting across the groups of the usual suspects when setting up governance processes or participative procedures. Choose a different point of entry every time you (allegedly) approach a similar problem or project. If possible, rotate small amounts of personal every time you finish a project.

All these fairly simple suggestions move practice into the tension of producing coherence and novelty at the same time, of triggering learning
in more intensive environments, of being able to do professional decision-making, but at the same time avoid premature consensus and stabilizations of representations.

FUTURE RESEARCH DIRECTIONS

This chapter only roughly presents some key ideas that may guide future research. There is a need for detailed empirical studies and fine-grained stories of knowledge creation in urban development. The development of a theory of knowledge creation in complexity-conditions, and a better understanding of the practices in urban development will need a co-evolution of the development of adequate theoretical concepts and empirical studies.

There are well-done empirical studies in the perspective of science and technology studies (STS) and actor-network theory (ANT). For instance, Potthast (1998) conceptualizes the architecture office as a laboratory of the city and investigates the creative design process in a Berlin high-rise building project as an assemblage of various representations from art books, material practice, design-shorthands, episodic communication, and so forth. However, as this very careful piece of research also shows, the theories used cannot provide an adequate conceptual and ontological basis to analyze knowledge creation in planning or design practice. The author suggests that from the basis of assemblage theory we may draw on existing concepts from organization and management studies as briefly outlined in this chapter. But also the field-theory of Pierre Bourdieu (1979), the just-mentioned STS approaches (Latour, 1987; Law, 2002), or feminist theory (Haraway, 1991) provides a conceptual source for further theoretical development. Adjacent empirical fields of research concern knowledge creation in temporary assemblages, such as architecture or planning competitions. This also might connect to research as undertaken by Maskell et al. (2006) on trade fairs as temporary clusters in the global knowledge economy.

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**ADDITIONAL READING**


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ENDNOTES

1 They are increasingly included into the decision-making processes in alternatives to liberal state democracy (Conolly, 1995).

2 This relativization of state command is fuelled by a third aspect, which refers to the significant decrease of confidence in the state as agent to solve collective problems (Healey, 2004c).

3 See e.g., Pickering (1993).

4 For further discussion, see e.g., Ibert (2007).

5 This is opposed to relations of interiority, where component parts are constituted by the very relations they have to other parts in the whole. This means that a “part detached from such a whole ceases to be what it is, since being this particular part is one of its constitutive properties” (DeLanda, 2006b).

6 Deleuze and Guattari develop these concepts mainly regarding language, literature and politics. (Deleuze & Guattari, 1987, 1994; Deleuze & Parnet, 2002).

7 In this section, the author largely follows DeLanda (2002).
Successful community involvement practices in one individual case produce an emerging capacity of the respective team to deal with such a situation. This will both enable the team to re-use its knowing and at the same time constrain it by inhibiting it to do it differently next time.
Chapter II

Academic Knowledge and Urban Development: Theory, Policy, and Practice

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The SURF Centre, University of Salford, UK

ABSTRACT

The terrain of knowledge-based urban development currently is confused by a plethora of competing, implicit and unarticulated assumptions that have resulted from differing interpretations of knowledge and the urban, and the relationship between them. This chapter offers a conceptualization of the role of academic knowledge and, by extension, the university in processes of urban development through the lenses of theory, policy, and practice. A distinction between knowledge-based urban development as process-, product- or acquisition-driven is developed. It then assesses the relative balance of these roles in policy and practice through a case study of Manchester, North West England, and, in so doing, distinguishes between the rhetoric and the realities of attempts to do knowledge-based urban development.

INTRODUCTION

In Western economies, knowledge is seen as the driver of economic growth and competitiveness (Bryson et al., 2000). For many, the post-industrial era is said to mark a new phase of capitalism, or knowledge capitalism (Burton-Jones, 1999), in which wealth creation and continued productivity is dependent on harnessing science, technology, skills, and knowledge as the foundations of economic and social development. The urgency with which national governments in Europe are addressing this challenge is compounded by the rapid rise of emerging economies in Brazil, China, India, and Russia, which are now competing not only on the basis of land or labor, but also as high-tech, high value markets.

In different national and sub-national contexts, knowledge is accorded a central role in economic growth and competitiveness. Yet there is no con-
sensus on what is meant by knowledge-based development (KBD), nor its relationship with space in the form of knowledge-based urban development (KBUD). While some scholars emphasize the role of ICTs and knowledge-infrastructures, others highlight entrepreneurial business practices, or product and process innovations, or knowledge management techniques. More recently, a body of literature around academic knowledge and the role of universities in the knowledge economy has developed in which universities have been equated to knowledge factories or bright satanic mills of the 21st century, intricately tied with the economic and social needs of the contemporary world (Harding et al., 2007). The terrain of KBUD currently is confused by a plethora of competing, implicit, and unarticulated assumptions that have resulted from differing interpretations of knowledge and the urban, and the relationship between them.

Despite such conceptual ambiguities, policy is proceeding at an astonishing speed in the race for success in the global knowledge stakes. Knowledge is increasingly conceived within multi-scalar environments where the interplay between sub-national, national, and international frameworks for action becomes paramount (Perry & May, 2007). Urban and regional development is overflowing with conceptual tags and geological imagery: from knowledge corridors, clusters or capitals, to silicon valleys, alleys, glens, and fens. Out of the media glare of well-known examples, such as Boston 128 or Silicon Valley, numerous regions and localities have adopted strategies towards knowledge-based economic development, such as Science Region Bonn in North Rhine Westphalia, initiatives around Provence-Alpes-Cotes-d’Azur in France or 22@bcn in Poblenau, Barcelona.

With this background in mind, the chapter has two key aims. First, it will seek to conceptualize the role of academic knowledge and, by extension, the university in processes of urban development through the lenses of theory, policy and practice. A framework for understanding the different roles attributed to academic knowledge in urban development is developed, distinguishing between process-driven, product-driven, or acquisition-driven views. It assesses the relative significance of the urban scale of action and the implications for the roles of universities as agents of change in KBUD processes.

Second, the chapter aims to assess the relative balance of these roles in policy and practice and, in so doing, to distinguish between the rhetoric and the realities of attempts to do KBUD. A case study of KBUD in England is discussed, with a particular focus on Manchester, North West England. National policy frameworks are examined that create a context for knowledge-based urban policies to develop largely from the bottom-up. The Manchester: Knowledge Capital (M:KC) initiative, which aims to make the Manchester city-region a global pivot in the knowledge economy, is discussed with particular attention given to the relationship between national and local views in interpreting KBUD. The aim here is not to provide an evaluation of the effectiveness and efficiency of the M:KC initiative; but, rather, to better understand different and dominant articulations and aspirations for KBUD in a particular urban context.

BACKGROUND

Studies on the role of the university in urban development have become more frequent over the past decade drawing on a range of interdisciplinary perspectives from economics, sociology, geography to social studies of science and technology. The drivers that are leading to closer engagement between universities and cities are wide-ranging, including processes of state rescaling, globalization, the withdrawal of the state in favor of the market or new public-private partnerships, and budgetary restraints (Harloe & Perry, 2004). The entrepreneurial-networked univer-city is one in
which both knowledge producing institutions and local authorities and development agencies are seeking to, being encouraged toward, or even coerced into collaborating to produce economic (and social) benefits at multiple scales (Clark, 1997; Oatley, 1998).

Within this context, the dominant tendency has been to adopt a narrow economic view, seeing universities as being to the “information economy what coal mines were to the industrial economy” (Castells & Hall, 1994, p. 231). Yet more recently, attention has been directed to the role of universities in learning and development processes (Archibugi & Lundvall, 2001) or their roles in relation to community outreach and development (Gray, 1999). Within recent academic work, there has been a pronounced shift away from examining only the passive impacts or direct economic effects of universities toward greater emphasis on the wider roles and contributions of universities to urban development (Charles & Bennworth, 2002; Charles, 2006). As Table 1 outlines, these include seeing universities as active partners in growth coalitions; the social, civic, and environmental contributions of universities toward locally set priorities; or the range of activities in research, teaching, and knowledge transfer that have potential local relevance. Current academic opinion is united on the need for greater sensitivity in studies of university-city relations and the disaggregation of the concept of the university, its activities and different forms of knowledge (SURF et al., 2006).

Such trends are only to be encouraged as leading to greater critical reflection on the nature of engagement between publicly funded universities and their localities, as well as the mechanisms through which the expected benefits from knowledge-based development might be achieved. However, as definitions broaden, the empirical focus of recent studies has become blurred: between universities as knowledge institutions and the academic knowledge that is produced within. At the same time, normative assumptions are often made about the impact of university-city interactions, with rhetoric often replacing action and hyperbole substituting implementation. Indeed, for many, there remains a real question over whether there is any substance to the promises of the knowledge economy or whether it is more a question of “old wine in new bottles” (Weingart, 1997). What is lost in the current (albeit desirable) broadening of the agenda on universities and cities is a deeper reflection on how knowledge itself is implicated in different processes of urban development and how different articulations of academic knowledge-based urban development interact in policy and practice.

THREE VIEWS OF ACADEMIC KNOWLEDGE-BASED URBAN DEVELOPMENT

A distinction between three dimensions of KBD can be made, drawing on a range of interdisci-

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<th>Table 1. Some key trends in the study of the ‘Univer-city’</th>
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<tr>
<td>From passive impacts to active partnerships</td>
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<td>From economic instrumentalism to community engagement</td>
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<td>From direct effects (employment, student spend etc) to indirect contributions (environmental, social, civic)</td>
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<td>Looking across the contributions from different kinds of activities</td>
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<td>Considering the role of different disciplines and knowledge in urban development</td>
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<td>Towards multi-scalar alliances</td>
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<td>Disaggregating the notion of the university and recognizing its multi-faceted nature</td>
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plinary contributions. This framework of understanding serves as a device to better understand the kinds of KBUD processes that are apparent, with all the usual caveats that such conceptualizations entail: they are not mutually exclusive, indeed it is more a question of emphasis rather than inherent incompatibility or conflict. What distinguishes each view is the relative extent to which knowledge itself is implicated in processes of urban development and the ways in which both the urban and the university are conceived.

First, KBD is about new processes of knowledge production. This view draws on Gibbons et al.’s Mode 1/Mode 2 thesis (1994), as well as the distinction between codified and tacit (or embedded) knowledge (Polanyi, 1958, 1966) or the well-documented shift toward knowing how as opposed to knowing that (Schon, 1983; Ryle, 1990; Sternberg & Horvath, 1999). Core to a process-driven view of KBD are fundamental questions relating to how knowledge is produced, for what reasons, by whom, for whom, and how it is subsequently judged. In relation to research, this involves multiple stakeholders in the definition of priorities, research questions, and the conduct of the research itself. Action research or policy-oriented work becomes more commonplace, with a linear model of knowledge transfer replaced by the concept of knowledge exchange through active and constant communication between stakeholders throughout the research process. Such concepts apply equally to pedagogy in terms of new working patterns and modes of engagement between academics, students, and/or local partners, such as new curricula to meet the skills needs of industry, placements, or continuing professional development.

An urban dimension is implicit within this conceptualization. The Mode 2 thesis makes no explicit reference to space or scale, seeing contexts of application as largely relating to the interstices between public and private sectors, rather than geographical locations. However, a process-driven conceptualization of KBUD involves partnership between different actors within a locality in the definition of research priorities and draws attention to the importance of institutional interests, including local authorities, business interests, and city partners as potential users of or participants in research processes. To take advantage of tacit and embedded knowledge through new modes of academic engagement requires spatial proximity over time. Of course, this may be afforded through short bursts of concentrated activity, such as in placements, but continuous interaction through well-established networks of communication is desirable to create the kinds of productive flows between knowledge-producing institutions, particularly universities, and knowledge users seen as necessary for competitive economic and social advantage. This is particularly the case given the interdisciplinary nature of urban studies, with traditionally strong connections to policy and practice, which is evidenced in the increasing emphasis on the notion of the urban knowledge arena (See May & Perry, 2005; Evans & Marvin, 2006).

For the university, the significance of a process-driven view of KBUD is three-fold: first, it involves new ways of working that finally break the illusion of the ivory tower; second, it requires engagement with academic staff at different levels of the university hierarchy outside senior management; third, it is characterized by multiple, fluid, informal and formal external interactions, almost impossible to map, let alone manage. While some commentators have posited the demise of the institutional authority of the university as a result of the rise of alternative sites of knowledge production (Gibbons et al., 1994), others have emphasized instead the continued pivotal role of universities within contemporary innovation processes (Etzkowitz & Leydesdorff, 1997).

Second, KBD can be about the exploitation of particular knowledge products, with processes of knowledge production hermetically sealed
from outside interference. This is more consistent with a Mode 1 of knowledge production in which the process of research is detached from the subsequent harnessing of knowledge for socio-economic benefit. Here the emphasis is on a more linear model of innovation and knowledge transfer, or on the mechanisms through which knowledge is managed and communicated, such as networks or ICTs. Knowledge-based development relates more to the changing nature of the industrial fabric, for instance, in terms of knowledge-based industries and the linkages between universities and businesses as a precursor for commercialization and spin-offs, rather than to the redefinition of academics’ research agendas and ways of working.

What is counted as knowledge tends to be broader in a process-driven view of KBD, taking in the sciences, social sciences, humanities, and arts. A product-driven view tends to be more economically driven and focused on the exploitable products of the physical sciences, in terms of new companies, patents, and intellectual property. There are, of course, exceptions to this tendency, for instance, in the latter case, increasing emphasis also is being placed on the cultural and creative industries and transmission of knowledge to pupils and students and the public more broadly.

A particular conception of the urban is inherent in this view of KBD. Recent years have seen a particular emphasis on innovation systems and the importance of spatial proximity, agglomeration economies, and knowledge spillovers (Dunning, 2000; Cooke & Piccaluga, 2006). Yet the urban generally is conceived either as a container in which innovation takes place, with few inherent properties or agency; or else as a locational factor in the attraction of knowledge-based assets or creation of particular environments. In other words, cities are where innovation or knowledge transfer happens to take place, rather than agents that actively seek to foster KBUD or direct beneficiaries. The interactions between universities and businesses, for instance, may take place within particular locations (particularly if incentives are tied to spatial boundaries) but are not driven by specific place-based factors.

In this view, what is the role of the university? This is a more managed view of KBUD as evidenced through the growth of technology transfer offices, business departments, and academic-linked science parks or business incubators. Individual academics are implicated in terms of intellectual property, but relationships can be mediated or brokered through specific liaison offices at the institutional level. The extent to which this is encouraged depends on the relative importance at the strategic level that is attached to income generation and spin-out activities.

A third view of KBD draws on literatures relating to urban growth coalitions and the new urban entrepreneurialism (Salet et al., 2003; Oatley, 1998; Harding, 1997). As Wilks-Heeg et al. note “city governance is increasingly characterized by a focus on entrepreneurial activities concerned with economic development and issues of production, rather than a concern with the more managerial issues of social welfare and collective consumption” (Wilks-Heeg et al., 2003, p. 30). Increasingly, cities have become more concerned with marketing, branding, and global success and position. In this light, the concept of the ideopolis—or city of ideas—has found particular resonance with policy and practitioner communities, popularized in the UK by Will Hutton, the Director of the Work Foundation as a means to capture the essential ingredients of a post-industrial city. The ideopolis was initially seen to have three key elements: a set of key physical and economic features; a particular social and demographic mix; and a specific cultural climate and set of commonly held values (Canon et al., 2003).

The ideopolis vision puts the urban into knowledge-based development, with a key leading role for local authorities as well as broader cross-sectoral city partners. Yet this is essentially
an acquisition-driven view of KBUD, about the ingredients that need to be acquired within cities as the basis for competitive success, rather than how knowledge itself can be harnessed for wider economic and social benefit. These include for instance: high-tech manufacturing; knowledge services; a university, or universities with strong networks to commercial partners; an airport and/or major communication nodes; architectural heritage and/or iconic physical development; a flourishing service sector; large numbers of highly skilled professional and front line service positions; a vibrant city culture and diverse population; an ethos of tolerance and significant local political direction; and policy autonomy (Canon et al., 2003, p. 16).

The ideopolis builds on Florida’s (2002) notion of the creative class and is concerned with attracting the right kind of knowledge workers, cultural feel, and buzz, physical regeneration and connectivity, as well as the support networks necessary to develop as a smart and modern city. Here, then, we have a different conceptualization of what KBUD might mean. Knowledge itself as a process or product has a role, but this is within a broader vision in which the acquisition of talent, research expertise, the development of assets and external symbols of success or marketing and image are equally, if not more, important—as tools in global positioning as much as urban regeneration.

Universities are seen as tools, instruments, assets, and status symbols to be acquired, harnessed, and their benefits extracted. In an acquisition-driven view, universities are one among many participants, operating on an institutional basis within strategic alliances with little engagement with individual academics. In the context of the knowledge-economy, universities may be part of urban growth coalitions that have, certainly in the case of Manchester, England, been attributed with delivering urban renaissance. Yet they may alternatively be absent—as it is their existence that is deemed important as assets, rather than the knowledge they produce. Knowledge as academic research is only a secondary concern; at the

Table 2. Three dimensions of knowledge-based urban development

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<th>Influences</th>
<th>Knowledge</th>
<th>Urban</th>
<th>University</th>
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<td><strong>Process-driven KBUD</strong></td>
<td>Social studies of science and technology</td>
<td>Knowledge as a process; new modes of knowledge production, ways of working, user engagement and knowledge exchange.</td>
<td>An active role. Range of local stakeholders, including city governments, involved in research processes. Varied political, economic, and social benefits.</td>
</tr>
<tr>
<td><strong>Product-driven KBUD</strong></td>
<td>Economics and innovation studies</td>
<td>Knowledge as a product to be exploited by end-users</td>
<td>A passive, facilitative role in terms of creating an environment for innovation. Indirect benefits to locality seen to accrue.</td>
</tr>
<tr>
<td><strong>Acquisition-driven KBUD</strong></td>
<td>Urban growth theory; urban entrepreneurialism; the ideopolis</td>
<td>Emphasis on the ingredients for success to be acquired; what rather than the how or why.</td>
<td>City governments at centre of new urban strategies. Emphasis on branding and position.</td>
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forefront, is an understanding of the knowledge city as being clever, smart, skillful, creative, networked, connected, and competitive. All too often, however, acquisition is seen as a goal in its own right, without due consideration of the factors that then lead to positive knowledge-based factors. As Simmie notes:

there are plenty of large cities containing good universities, numerous firms and business services between which knowledge spillovers could take place that, nevertheless, do not develop strong virtuous circles of innovation and economic growth (Simmie, 2002, p. 899).

Three dimensions to KBUD have been identified: process, product or acquisition-driven (see Table 2).

In each case, however, the relative importance of knowledge and space alters. In the first, knowledge is central and subject to change as a result of external pressures, whilst in the last, knowledge itself is only a small part of KBUD processes, embedded in a wider set of economic, social, and cultural processes. Similarly, while the urban is only implied and peripheral in process, or product-driven KBUD, place is central to the concept of the ideopolis in which local authorities themselves take a central role. As previously noted, this is a distinction of emphasis rather than an inherent contradiction, between knowledge-based development that takes place within particular city contexts and urban development some of which is knowledge-based. Acquisition-driven KBUD may be necessary, but is not sufficient to harness knowledge as a factor in growth and development. Indeed, the hypothesis put forward here is that only through a combination of all three dimensions into a more holistic KBUD vision can the expected benefits of the knowledge economy be delivered.

THE POLICY PERSPECTIVE: KB(U)D IN ENGLAND

Governance and Policy Responsibilities

Traditionally, the UK has been seen as the archetype of a centralized country, but devolution since 1997 to Scotland and Wales and the creation of Regional Development Agencies (RDAs) in the English regions has led to the emergence of a more permeable system of multi-level governance (Bache & Flinders, 2004). In relation to KBUD, two policy areas emerge as important: science policy (taken here to encompass both research and higher education) and economic development.

Historically the governance of science policy has been centralized. Research funding in England has been allocated through the dual support system. The first element comprises the seven Research Councils under the Director General for Research, managed through the Office for Science and Innovation (OSI), to which academics and consortia of academics bid for specific project-funding. The second element is the Research Assessment Exercise (RAE) managed through the Higher Education Funding Council for England (HEFCE), under the Department for Education and Skills (DfES), which allocates funds to institutions on the basis of the quality of research in key units of assessment. In England, until very recently, there has been no official role for regional or local agencies in the governance of science policy. Policy-making frameworks have been set nationally. However, in the absence of a written constitution and in light of the strengthening relationship between science and economic development, science policy-making has become more open, negotiable, and contested in different functional areas, undermining the grip of national agencies on policy-making processes (Perry, 2007).
In England, responsibility for economic development is partially devolved with a division of functions between the Regional Development Agencies (RDAs) and local authorities. The RDAs were established in 1999 with five statutory objectives: to further economic development and regeneration; to promote business efficiency and competitiveness; to promote employment; to enhance the development and application of skills relevant to employment; and to contribute to sustainable development (DETR 1999). The Government’s White Paper of 2002 “Your Region, Your Choice” outlined potential mechanisms for strengthening these arrangements, through for instance, the creation of directly elected regional assemblies. But, following a failed referendum in the North East region in 2004, changes to the regional architecture in England have been postponed.

Recently, proposals for strengthening the roles of local authorities in economic development have been set out (HMT et al., 2006). Key measures include recognizing cities as engines of economic growth through strengthening the economic development functions of local authorities and city development companies; increasing the role of local authorities as strategic leaders and place shapers; and providing a framework for cross-boundary, city-regional working (DCLG, 2006). Officially, this is not presented as a replacement for regional government in the wake of failed attempts for democratically elected government, indeed the new inter-regional strategies and city-regional approaches are not seen as mutually exclusive. In practice, however, the future governance of England’s spaces and places remains an open question.

The Context for KBUD

Over the past five years a fertile context for interest in the concept of KBUD has been created in England. On the one hand, science, innovation and higher education policy is becoming more sensitive to the role of regions, and to a lesser extent cities, in meeting key objectives. On the other, cities are recognized as key drivers of regional and national growth in the context of a knowledge-based economy.

Since 2000 science and innovation policy has become more sensitive to the roles of RDAs in delivering on government aspirations, albeit reluctantly. Whilst the funding of research continues to be defined as the preserve of central government, RDAs have been acknowledged as partners in innovation and science exploitation, as well as developing relationships between HEIs and business, for instance, in relation to the Higher Education Innovation Fund (HEIF) (Potts, 2002). This relates directly to the economic development functions of the RDAs and the recognition, exemplified in the recent 10-year Framework on Science and Innovation (HMT et al., 2006), that innovation is central to regional growth in the modern knowledge economy.

National recognition follows bottom-up developments in relation, for instance, to the creation of science and industry councils (SIC) in the English regions. The first SIC was established in the northwest of England in 2001 and only in 2004 was the creation of SICs in all regions recommended by national government. Importantly, there has been a recent recognition that attention needs to be given to differences in regional performance in relation to R&D as “supporting science and innovation in the regions is essential if the Government’s ambitions for the UK as a whole are to be achieved” (HMT et al., 2006, p. 19).

Despite this regional focus, throughout the early 2000s, the role of cities in science and innovation policy was largely absent. Regional and local have been seen as synonymous, without due consideration of the potential active role of local partners in delivering on government objectives. The situation recently has changed, with the designation of six Science Cities—Manchester, York, and Newcastle (2004) and Bristol, Birmingham, and Nottingham (2005)—in order
to drive forward the government’s objectives for science and innovation. Whilst at one level this is important recognition of the localized nature of innovation, no additional finance has been forthcoming and ownership of the initiative is ambiguous, falling between the departments for Trade and Industry, Education and Skills and Communities and Local Government.9 Support nationally has mainly stemmed from the Treasury, with vocal proponents such as the Chancellor of the Exchequer or the former Minister for Science, Lord Sainsbury. However, this has not been mainstreamed within policy-making departments, and the content of the initiative has been left to be designed by local actors.

At one level this hands-off approach has been presented as deliberate strategy: “we should not seek to have a national plan for science cities or dictate what individual areas do” (Sainsbury, 2006). Of course, context matters (May, 2005), and what works in one city may not be appropriate for all. Nevertheless, recognition that national imposition is not desirable, nor feasible, has been taken as relieving Government from the responsibility of setting out clear and supportive frameworks of understanding. At the same time, as with the development of regional SICs, promotion of Science Cities nationally followed—rather than led—local developments in key cities. York’s Science City launched in 1998, and Manchester’s Knowledge Capital initiative dates from 2002.

For universities, what we see are drivers encouraging collaborations at different spatial scales. On the one hand, recent government frameworks have expressed commitment to bringing major improvements to the funding of research and boosting world class excellence through explicitly setting down the aims of research concentration (DfES, 2003, p. 5). The need for international profile, tapping into global student markets, links with major multi-nationals, collaborations with world-class universities through Science Bridges, and success in research league tables leads to global orientation and the disembedding of universities from their localities. At the same time, however, current policy notes the need for greater knowledge transfer and to engage HEIs with their regional economies to strengthen the economic, social, and cultural contribution of universities to their localities (DfES, 2003, p. 9). This has been termed the third mission for universities in addition to their traditional functions of teaching and research. Yet, incentives for university engagement and outreach remain small compared with those that encourage institutional positioning and competition. In addition, a shift can be seen in HE policy toward greater diversification of mission and specialization of roles across the sector. Not all HEIs will deliver on all of these agendas, but rather should focus on their strengths either in research, teaching or outreach. In particular, a strong dichotomy is emerging between “world-class research universities” and “regional ones that focus on professional education and regional companies” (Lord Sainsbury, former Minister for Science and Innovation 2006). The global/local dichotomy, referred to above, is, therefore, seen to be managed by virtue of a division of labor between universities.

Through the lenses of regional and urban policy, a context for KBUD also can be seen through an increasing emphasis on science, innovation, and enterprise as drivers of growth. From an initial focus on business innovation and clusters, the RDAs have expanded their remit to include measures to enhance university-industry links and developed science and industry councils, both in response to government policy as well as from the bottom up. The most recent iterations of the Regional Economic Strategies see an enhanced role for universities as partners in innovation, skills, and regional development, and the centrality of exploitation of the science base as a precondition for economic growth. The Northern Way strategy, bringing together the North West, North East and Yorkshire regions to raise productivity and transform the sub-regional economies, also is strongly based, in theory, on science, innovation and skills (ODPM, 2004). This intention is embodied in the formation of the N8
research alliance, a collaboration between the eight most research-intensive universities in the North of England aiming to deliver on the Government’s Science and Innovation Framework by translating critical mass into societal and economic benefits (Page & Secher, 2006).

Similarly, urban policy has shifted toward greater consideration of the challenges posed by a global knowledge-based economy. Urban strategies in the early 2000s made limited mention of exploiting technological knowledge through increasing the proportion of innovating businesses, and noted the need for HEIs to work with RDAs on regeneration and skills agendas (DETR, 2000). However, more recently, the Local Government White Paper places science and innovation at the heart of urban policy, noting that high-value knowledge-intensive sectors tend to locate in cities (DCLG, 2006). The challenge has not fundamentally changed since 2000: to raise productivity through addressing skills, innovation, enterprise, competition, and investment. What has changed is how the inter-relationship between these drivers has been seen and the relationship to traditional urban problems: “a high value-added, knowledge-based, high skill economy can lead to the achievement of wider social goals” (DCLG, 2006, p. 15). Significantly, however, despite being published in 2006, the Local Government White Paper does not mention the Science Cities initiative. This absence is all the more surprising given that it was preceded by the joint Treasury, DTI, ODPM document on cities and regional growth (March, 2006) that explicitly supported the concept of Science Cities in creating the right ecosystem for innovation at a local/regional level.

Understanding KBUD Through Government Policy

The above discussion shows how a context has been created for KBUD in England. KBUD finds its greatest expression in the concept of Science Cities, but this is not well-shared between government departments, and the boundaries between departmental and geographical responsibilities are blurred. Here, we see a concept, but little policy content, leaving this to be defined from the bottom-up. The emphasis is more on KBD and the role that local actors can play in achieving national objectives, than on KBUD itself. For the DTI, KBD is largely product-driven, about exploiting science rather than engaging with the processes of knowledge production. It is primarily about science as science, engineering and technology, rather than knowledge, including the social sciences, arts, and humanities. Different roles are envisaged for world-class and regional universities, with institutions generally seen as assets rather than active participants in growth, or contributors to the formulation of context-sensitive public policy. Elsewhere, a more process-driven view can be seen, for instance, in certain discrete Research Council-funded programmes aimed at knowledge transfer or knowledge exchange. However, such initiatives tend to be on the margins of mainstream policy, badged as experiments rather than fundamentally new ways of doing research.

The urban, itself, is peripheral to such articulations. Importantly, government does not see its role to define the content of KBUD, leaving that to local interpretation.

Indeed, it is noteworthy that, although the context for KBUD can be identified through a detailed reading of the government’s own policy frameworks for science and urban/regional economic development, explicit support for this has remained minimal at the national level. Policy is not joined-up between government departments or between territorial tiers of action. Developments, such as regional science and industry councils, or the predecessors to Science Cities, have emerged from the bottom-up and only subsequently been endorsed by central actors. There is a mismatch between governance structures, policy frameworks, and the capacities and resources of local actors to deliver. In particular, while economic
development is increasingly devolved, science and higher education policies remain essentially national. As a result, tensions are passed down from national to local levels, in relation, for instance, to the balance between global and local scales of action, the pursuit of academic excellence and need for user relevance, and the drivers for universities to alternatively collaborate, or more frequently, compete.

‘MANCHESTER: KNOWLEDGE CAPITAL’: KBUD IN PRACTICE

Following the preceding sections, there are two key questions that inform this final discussion of KBUD in practice: first, how has KBUD been interpreted locally, and second, how have national frameworks and local conditions interacted to constrain or encourage the development of KBUD?

The choice of Manchester as a case study region provides a very particular view on such questions. Manchester already has generated a rich academic literature, as an example of an entrepreneurial city, in constant revolution and at the forefront of new urban-based initiatives. Peck and Ward’s (2002a) edited collection on Manchester’s recent history highlights key attributes of the city’s political, economic, and social context: its tendency for first-mover status; the embrace in the 1980s of municipal entrepreneurialism; strong public-private partnerships resulting from processes of collective bidding; continued difficulties in turning economic and physical regenerations to the benefit of the socially excluded; and an abundance of creativity and energy that is, nonetheless, accompanied by reactive and limited actions (Peck & Ward, 2002b). Against this background, it is, perhaps, unsurprising that Manchester began the journey toward a knowledge capital as a result of localized bottom-up processes, rather than on the stipulation of national government frameworks. This provides the opportunity to examine local interpretations and subsequent interactions with national policies.

Figure 1. Building the ideopolis? (Adapted from NWDA Regional Economic Strategy, 2006)
Academic Knowledge and Urban Development: Theory, Policy, and Practice

Building on its history as a front-runner in becoming a post-industrial city, Manchester also provides a lens through which globalizing dynamics are magnified and accentuated (Dicken, 2002). As Peck and Ward (2002b, p. 9) note, “social, economic and political change, while not always made in Manchester, nearly always yield particularly vivid expressions and/or responses here.” While York coined the term Science City in 1998 bringing together the University of York and the City Council, Manchester’s re-interpretation of the knowledge challenge has been altogether bolder, more wide-ranging and ambitious in scale and scope. While there are particularities to the Manchester case, it also provides indicative insights and lessons into KBUD processes more generally.

Manchester’s answer to the challenges of knowledge-based growth is encapsulated in the Manchester: Knowledge Capital (M:KC) initiative. M:KC was developed in 2002 as a result of discussions between the City of Manchester and the Work Foundation who produced a study on Manchester’s potential to become an ideopolis, building on such assets as enhanced HEI cooperation with the city, its concentration of knowledge workers, the presence of a medical school and international airport. The vision was subsequently developed, “to create an internationally acclaimed ‘Knowledge Capital’ within the Greater Manchester conurbation, which will position Manchester, branded as the Knowledge Capital, at the heart of the Knowledge Economy, significantly contributing to the economic growth of the nation and the North West region leading to a healthier city/region with a vibrant, safe and attractive environment in which to live, work and play, for people of all ages, social and cultural backgrounds” (Manchester: Knowledge Capital, 2003).

The initial phases of development of M:KC were hectic and confused, in terms of leadership, funding, management, and orientation. An initial series of national and regional meetings, numerous launches both in London and Manchester, and a number of unforeseen events resulted in a reactive and ad hoc start-up phase. In particular,

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while it was originally intended to produce a Master Strategy Plan for Knowledge Capital with thematic action plans feeding into this, the request from the Office of the Deputy Prime Minister (ODPM) in 2003 for the Core Cities each to produce a prospectus outlining their city visions led to a different emphasis, set of power relations between actors (most noticeably by increasing the City Council’s lead), and set of timescales being imposed. The bottom-up development of the initiative was temporarily de-railed by the need to respond to national imperatives in the hope that this would result in increased funding. The need to be “seen to be doing something” overshadowed questions of clarity, communication and consistency of message, with various and ambiguous interpretations of what knowledge capital meant has been reached on important elements of strategy and organization. The main characteristics of the M:KC initiative, as it is currently constituted, are summarized in Table 3. The designation of Manchester as a Science City followed the creation of M:KC in 2004. Rather than run as a rival initiative, Science City has been incorporated within M:KC as an element of ongoing strategy.

At its core, the vision for M:KC is exciting, ambitious, and all-encompassing. A deliberate play on words, its title refers to the desire to make Manchester the capital city for knowledge through drawing on its knowledge capital (financial, human, social). At a senior level, knowledge-based growth is seen as linked to social development in a view of KBUD that is simultaneously about processes, products, and assets (Garner, 2006). The aim is as much to link research—across disciplines—to city-regional priorities, in association with industry, as it is to create the kind of vibrant place in which knowledge workers would want to work. The initial conceptualization of the ideopolis was largely acquisition-based and served as a focus around which consensus and partnership could be formed. The Executive Team of the initiative has, however, re-interpreted the concept to refer to a broader and more holistic view of KBUD, which offers the potential for resolving tensions between excellence and relevance, and ways of universities working together. There is a particularly strong synergy between the articulations of aspirations for M:KC by the Executive Director, Chair of the Board, and those immediately responsible for implementation. The potential is seen as vast for creating new ways of developing city-regional economies with clear benefits for different community groups. In this respect, while M:KC is about the new Manchester, it seeks to engage with the old in the context of “a continuously changing Manchester that is altogether more complex and contradictory” (Peck & Ward, 2002b, p. 10).

What happens to the vision in practice, however, is that certain actors and ways of seeing KBUD become dominant. A strong focus on physical development, estate management, and developing world-class universities and places through attracting knowledge workers and developing a cultural buzz has emerged, rather than concern with the processes of knowledge production and transmission themselves. It is simply easier, in practice, to have partnerships around physical development than it is to understand complex, non-linear processes of knowledge production or transfer. This is not to question the aspirations of those governing M:KC; merely to note that the achievement of a more holistic vision is far more uncertain and certainly more difficult than acquiring assets and reconfiguring territorial identities. This, in turn, has consequences for the differential interpretations of KBUD in terms of how economic and social benefits expected are to be realized, with many believing in the automatic effects of trickle down to more disadvantaged communities rather than active and managed efforts to ensure that the advantages of M:KC can be shared.

Outside the core of believers in a new knowledge-based urbanism, others tend to see only parts
of the picture and retreat instead to established institutional patterns of behaviour. For many, M:KC is about attracting additional resources; global positioning; science parks and spin-offs; enterprise; teaching; estate management; or physical redevelopment. The totality of the vision is only grasped by a few. As a result, there is a tendency for M:KC, in practice, to be about the re-badging of existing initiatives or to include those activities that would have happened anyway according to the strategic priorities of key actors. This leads to a question over whether or not the sum is indeed greater than the parts. Whilst early versions of the strategy envisaged new strands of work designed to realize M:KC, it now exists more as an umbrella for existing urban activities such as the City Growth Strategy or Manchester is My Planet initiative.

A lowest common denominator approach—represented in the catch-all notion of the ideopolis—has emerged as a result of neither local, nor national, but rather of local-national factors. Tensions between local authorities and between universities have combined to make collective action more difficult, albeit not impossible. While M:KC is a partnership between 10 different local authorities in the city-region, Manchester City Council is seen to be leading, embracing the ideopolis as the next big thing in the strategy of an entrepreneurial city (Work Foundation 2006a, b). Salford City Council, in particular, is seeking to play its role, but there remains a mismatch between individual authority aspirations and the collective vehicle (M:KC) that is available for implementation. This is a both a local and national issue in relation to the particular histories of collaborative working in the sub-region, the more generalized mismatch between functional economic entities and administrative units, and the governance gap that has resulted from wider regional-local dynamics (Barlow, 1995; Jones et al., 2005).

Local-national factors have led to parallel processes, which act as incentives or disincentives for collaboration between universities. Universities are busy niche-carving and thinking about strategic orientations rather than city-regional benefit. Academic engagement is variable and public visibility low. Government departments’ views of science and space are ambiguous and not joined-up, with the result that different actors receive different messages about their orientation and focus. The issue of metrics also is important here, in terms, for instance, of the difficulty in measuring the intangible benefits of partnership, public understanding, or knowledge transfer, compared with tangible quantifiable outputs, such as spin-outs or jobs created through regeneration projects (PREST/CRIC, 2006). The point is that targets and incentives set nationally govern the behavior of knowledge-producing institutions, whilst benefits are expected to accrue to multiple scales.

In this context, the increased strength of the University of Manchester, following a merger with the University of Manchester Institute for Science and Technology (UMIST) in 2004, and the support given to the institution by the NWDA and local partners, has temporarily disrupted emerging patterns of collaboration. Continued regional disparities in the distribution of public sector R&D have meant that the newly merged institution is widely seen as the best chance of drawing funds away from the relatively privileged South East. The balance of power has, therefore, shifted further toward the dominant research-intensive university, while it is other institutions that aim more explicitly to serve local and regional communities. The suspicion of many local actors is that M:KC serves the coinciding interests of Manchester City Council and Manchester University, rather than the broader city-regional partnership that has developed to deliver it.

While the bottom-up visions for KBUD as expressed through M:KC are far more ambitious than those at national level, the implications of an ambiguous national context, with mixed messages for universities in relation to their global and local roles, is such that this vision has subsequently been
diluted. M:KC is an amalgam of rationales and interpretations, and existing institutional preferences dominate. In so far as the M:KC partnership is precisely about intermediating between distinct agendas, one could argue that it is not necessary for all partners to grasp a more holistic vision, if those responsible for implementation have the necessary acumen to draw disparate strands of activity together. Nevertheless, in practice, this means that developments happen in sub-optimal conditions and that the potential synergies of new urban knowledge coalitions are not being realized.

The discourse of the knowledge economy emerges primarily as a hook through which objectives of physical regeneration or global positioning can be met. At the local level, understandings of KBUD oscillate between theory and practice; the theory of knowledge-based growth and the practice of coalescence of certain key actors around an acquisition-driven, largely externally oriented agenda. As it stands, KBUD has become more about regenerating places, representing existing activities, attracting additional resource, and only lastly about knowledge as a product or process itself as the basis for city-regional transformation.

Finance has been a key limitation in this respect, and it remains to be seen what the impact of the forthcoming Innovation Investment Fund might be, funded by the National Endowment for Science, Technology and the Arts (NESTA) and local partners and to be launched in July 2007. The hope is that this might lead to a new phase of development in which the closer orientation of universities and academics to sub-regional needs can be achieved through adequate incentivisation.

CONCLUSION

This chapter has offered a conceptualization of three dimensions of KBUD as process-, product- and acquisition-driven. From this analysis, it seems likely that the three elements of KBUD reflect stages in development over time rather than mutually exclusive models. The hypothesis that emerges to be tested through further research is that partnerships are first built through an acquisition-driven stage of KBUD, where alliances are forged on the basis of mutual agendas and coincidence of interests. Initiatives such as M:KC can be seen as boundary objects (Guston, 2001), mechanisms through which science and politics—in this case, the public and private research base and city partners—can come together to share language and culture as a precursor to more meaningful engagements. This is then followed by the exploitation of knowledge or the use of particular products, whether this is a patent, a spin-off or a course for teaching practitioners in the field of regeneration. Finally, once the building blocks have been acquired or developed and partnerships have been built, engagement with knowledge itself becomes possible. The earlier phases of development set the parameters for this engagement, in terms, for instance, of the degree of penetration of outside influences into the work of the university, such as in relation to the balance between demand and supply-led teaching provision, between instrumental and curiosity-driven research.

The analysis here suggests that KBUD not only has stages of development over time, but that the realization of different stages is contingent on a range of local-national factors. Compared with early models of local science-based growth, such as science parks or the development of technopoles in Asia and elsewhere, the embryonic approach in Manchester is interesting in terms of the breadth of its vision, across disciplines, across areas of activity (research, teaching, enterprise), and in terms of the range of agendas to which knowledge is seen to contribute (science, innovation, sustainability, culture, employment, regeneration, skills etc.). Yet, in practice, KBUD appears more as a coincidence of existing interests between key partners—the same agendas in different clothes—with the experience on the ground indicating a struggle to get beyond institutional
interests to common goals that are shared between more than a converted few.

At the national level, we see articulations for knowledge-based development, some of which is urban; at the local level, the mirror image presents in terms of urban development, some of which is knowledge-based. In theory, this should result in productive alliances between national and local actors, yet this is not currently the case. Success in harnessing the potential of knowledge as a factor in city and regional growth is largely dependent on the ways in which national frameworks for action encourage particular kinds of institutional behaviors, for city councils as much as universities. Incentives matter as do the signals that come from government departments and the targets that are set to judge success. It is not a question of restrictive national dictates, but rather the creation of positive frameworks for and in action at national and local levels. The achievement of bottom-up aspirations for KBUD requires neither excessive government intervention nor complete abnegation of responsibility. Without such joined-up thinking between scales of action, the potential on the ground for the new knowledge-based urbanism to take seed is limited.

**FUTURE RESEARCH DIRECTIONS**

Three avenues for further research present themselves as a result of this analysis. First, there needs to be greater testing of the relevance and applicability of the different dimensions to KBUD in national and local contexts. Second, it is clear that further research is needed on the ways in which different universities perform diverse roles in urban growth coalitions and the distinctions between research-intensive, teaching or enterprise institutions. Third, in relation to the specific case of Manchester, a timely evaluation of the effectiveness of the M:KC initiative and the lessons to be learnt for other cities needs to be carried out.

**ACKNOWLEDGMENT**

Acknowledgment and thanks to Tim May as a co-investigator on research informing this chapter.

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Academic Knowledge and Urban Development: Theory, Policy, and Practice


ADDITIONAL READING


ENDNOTES

1 The chapter is based on research undertaken in the Manchester city-region, North West region, and national government departments between 2003 and 2006 funded through various sources including the Economic and Social Research Council and CONTACT Partnership of Greater Manchester Universities. Over 100 interviews have been carried out with University Vice Chancellors and Pro-Vice Chancellors, academics, city council representatives, business enterprise leaders, the Chief Executives and Chairs of M:KC, regional development agencies and national government departments including the Office for Science and Technology (OST), Department for Trade and Industry (DTI), Department for Education and Skills (DfES), Treasury, and research-funding agencies. Interviews have been supplemented by documentary reviews of key European, national, and regional policy frameworks. This usage is borrowed from the “Universities” network, run through the Technical University of Catalonia in the early 2000. Other examples of the use of this term also can be found online.

2 The Urban Knowledge Arena is a term that has been used in relation to an EU COST Action programme to explore and develop a European arena for cross-boundary, integrated knowledge, and know-how on complex urban problems. SURF also have used the term in relation to a project funded by the CONTACT partnership of Greater Manchester Universities on the “Greater Manchester Urban Knowledge Arena.”

3 The use of the word illusion reflects the fact that universities’ autonomy has only ever been partial in practice, more so in the post-WWII era than previous times.

4 As has been documented elsewhere there are differences in the intellectual property regimes between countries and institutional contexts (Charles 2006). The extent to which academics own their own IPR or share with the university is dependent on national-regional contexts, although they are typically implicated to some degree.

5 The Work Foundation, previously known as the Industrial Society, is a not-for-profit organization active in England in the areas of policy research, consultancy, and campaigning.

6 At the time of going to press, a government reshuffle, following the accession of Gordon Brown as UK Prime Minister, has taken place (July 2007). The Office for Science and Innovation has now been replaced by the
Department for Innovation, Universities and Skills (DIUS). In practical terms, the result is that the two strands of the dual support system now come under a single government department. A separate Department for Business, Enterprise and Regulatory Reform (DEBRR) has been established.

The Research Council system is UK-wide, encompassing Scotland, Wales, Northern Ireland, and England. However, the devolved territories have separate funding councils for the allocation of quality-related funding. Whilst the recent government reshuffle goes some way toward more joined-up thinking through bringing innovation, universities and skills together, business and enterprise remain in a separate department as do cities and regions.

The Core Cities group was established in 1995 and brings together the city councils of eight major English cities. The group includes Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham, and Sheffield. This group does not map on to the designation of Science Cities (Liverpool, Sheffield and Liverpool are not included), whilst the Science Cities group also includes York, which is not a core city. The reasons for this are due to the pre-existence of York Science City within the Yorkshire and Humber region prior to the official designation of Science Cities. This situation creates a difficulty for collective action between the cities as well as the justification of the Science Cities themselves.
Chapter III
Creative Industries and the Urban Hierarchy: The Position of Lower Tier Cities in the Knowledge Economy

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ABSTRACT
As the 21st century progresses, the most successful economies and societies will be creative ones. Worldwide, governments are producing strategies to encourage the development of creative industries and to strengthen the role of knowledge cities nationally and internationally. There is significant policy discussion regarding the role of creative clusters in strengthening local economies and significant energy has been expended discussing the many positive outcomes of such developments. This chapter takes these issues as a starting point and considers the role of creative industries within broader concerns regarding regional development. Referring to data and analysis on the urban and regional geographies of creative industries the chapter considers the extent to which places at different levels of the settlement hierarchy can successfully develop creative industry nodes.

INTRODUCTION
The importance of creative or knowledge work to economic success, if not the mechanisms of fostering such work, is widely appreciated. Atkinson (2001) reports in the U.S. “high-tech output has grown four times faster in the 1990s than the economy as a whole and high-tech jobs pay an average of 78 percent more than the median wage. Information technology industries
Creative Industries and the Urban Hierarchy

now represent 8.2 percent of GDP—up from 4.9 percent in 1985—and are expected to account for approximately 15 percent of GDP in 2020.”

For Venturelli (2000, p. 15): “in short, a nation without a vibrant labor force … does not possess the knowledge base to succeed in the [Knowledge] Economy, and must depend on ideas produced elsewhere.” At the regional and/or local level the impact becomes more acute as a region’s comparative advantage is now, more than ever, tied to its ability to attract the right talent. The importance of creative talent for regions or cities was highlighted by Jacobs (1969) and earlier by Ullman (1958), and there has been significant recent empirical work illustrating the links between clustered human talent and regional economic growth (Glaeser et al. 1995; Glaeser 1999, 2000; Simon 1998) Within Australia this argument has been forcefully made by National Economics (2002). They declare:

Leading regions establish competitive advantage through their capabilities. They are vehicles for resource mobilisation that can almost instantaneously bring together the resources required to launch new businesses and turn innovations into successful products. For these reasons the nexus of competitive advantage shifts to those regions that can generate, retain and attract the best talent. This is particularly so since knowledge workers are extremely mobile... (National Economics 2002, p. 61).

That cities have become taken with the idea is perhaps an understatement. Several international organizations have recognized this area of policy and have released discussion papers or established Websites. For cities and regions the focus has been on development plans and discussion papers that identify a case for localities to develop creative industry niches, centers, and clusters, or to attract workers with the desired creative skills. Florida’s (2002) The Rise of the Creative Class has been particularly influential here (and also widely criticized) with several countries developing their own creativity index with which to compare regions or cities performance in terms of potential for developing creative industry niches.

Other approaches can be seen in European examples such as the discussion paper on the economic potential of the creative industries in Vienna (Ratzenbock et al., 2005), Zurich’s creative industries synthesis report (Held et al., 2005) the studies of the East Midlands, Yorkshire, Manchester, and the UK studies more widely (Comedia, 2001; Bretton Hall College, 2000; Department of Culture, Media and Sport,1998, Fleming, 1999, O’Connor, 1999). In the United States documents include the blueprint for investment in New England’s knowledge economy (The New England Council, 2001), while elsewhere similar policy documents and discussion papers have been developed (Hong Kong Development Council, 2002; Singapore Ministry of Information, Communication and the Arts, 2002; New Zealand Institute of Economic Research, 2002).

Within Australia, federal government initiatives through various departments have funded projects that would develop and strengthen local entrepreneurialism and creative industries, while state governments have identified creative industries as key industries in regional development. The Queensland government’s document titled, “Creativity Is Big Business: A Framework for the Future” and the Gold Coast city’s “Australia’s Innovation City” framework are examples.

In light of the foregoing, a significant question relates to the extent to which these broad regional development policies are capable of delivering positive outcomes for regions at differing levels of the settlement hierarchy. While tier one cities are seen as the main creative centers, can lower tier cities and regions work at developing a burgeoning creativity presence? With reference to this question, some skepticism has been expressed on this issue previously. This chapter adds to that skeptical interpretation, It does so by considering some recent Australian research on
the economic geography of creative industries both broadly across Australian regions as well as within large metropolitan cities to confirm a very substantial spatial concentration of economic activity. It argues that this spatial concentration is a reflection of the deep-seated influence of agglomerative forces, something that will seriously limit the development of creative industries outside large agglomerations. That insight is reinforced by some links between this work and that carried out by Baum and O’Connor (2005), which found that the substantial re-location of population at the regional scale in Australia has not been matched by the re-location of producer service work; the current results explores that relationship on a subset of the producer service category of work. The chapter first defines its grounds and then explores the selected activity at two scales before returning to these conceptual and policy issues.

BACKGROUND: CONCEPTS AND ISSUES

Mazarr, in his book Global Trends, 2005, An Owner’s Manual for the Next Decade, argues we are living in a period of social transformation. His authority is Peter Drucker, an early advocate of “the knowledge society.” Drucker suggests “every few hundred years in Western history there occurs a sharp transformation. Within a few short decades, society rearranges itself—its worldview; its basic values; its social and political structure; its arts; its key institutions” (cited Mazarr 1999, p.1).

Analysts who accept the idea of a fundamental re-ordering in contemporary society characterize it as a move to an information or knowledge economy. In this perspective, the emergent networked society is seen as superseding an outmoded industrialism based on the uni-dimensional assembly line. The geography of production also is seen as changing—from the nation state of Fordist industrialism to a contemporary globalization. The key insight, as far as production is concerned, is that modern economic activity has moved from a primary focus on goods to a more diffuse focus on process. This shift impacts across all areas—economic, social, political, and environmental. Contemporary material production is not so much about making things as about analyzing the process of making them. Knowledge industries become more the norm than the exception. The knowledge economy consists of the application of this new knowledge to the more traditional industry sectors (such as agriculture and manufacturing), as well as its application to itself—the modern knowledge or information sectors. While old economy sectors do not disappear, they do make up a smaller share of jobs. Drucker (1993, p. 46) reports that in the developed countries of the 1950s people who worked “to make or move things were still in the majority. By 1990 they had shrunk to one-fifth of the work force. By 2010 they will form no-more than one-tenth.” Closer to home Ruthven (1999, p. 20) has found:

Australia is moving from a period of sweeping change in the structure of its industries. The enterprises, their activities and their importance to the economy differ significantly from the position 50 years ago and show radical changes from the position that existed at the beginning of the [last] century.

In our growing knowledge economy, the talent and creativity of those around us will be increasingly decisive in shaping economic opportunity. Prosperity now depends less on access to physical resources and more and more on the ability to create economically useful new ideas. The scientific literature on the knowledge economy confirms the new importance of knowledge work and knowledge workers as engines of economic growth. The claim that the growth of cities is related to human capital can be dated back to Jacob’s (1961) work on the economy of cities. Since then, extensive
empirical work has confirmed a link between human capital and economic growth. Glaeser et al. (1995), for example, found precisely such a strong relationship; while Glaeser (2000) suggests access to scarce human capital, rather than finance capital, is a key driver for firms clustering in a particular location. Similarly, Eaton and Eckstein (1997), and Black and Henderson (1999) both found productivity gains through knowledge spillovers when people are co-located (Chen & Choi, 2004).

The basic idea behind human capital theory is that people, rather than money, are the motor force of economic and social growth. Human capital is, thus, the major variable in endogenous growth models (Reich, 1992; Saxenian, 1994). The conclusion of such models is that the key to regional growth lies not in reducing the costs of doing business, but rather in concentrating a critical core of highly educated and productive people.

At the turn of the millennium, Florida (2002) advanced the idea of replacing the concept of human capital, as the source of economic growth, with the construct of creative capital. Creative capital differs from human capital in the quality of labor essential for higher productivity and growth. For Florida creative people, the creative class, rather than good workers are the key. Florida breaks his creative class into two broad sections: 

- **Super-creative core:** As might be expected, this group includes scientists and engineers; poets and novelists; artists, entertainers, and actors; designers and architects. Florida also includes what might be termed the “thought leadership” of modern society. This group, of which Florida himself is a part, includes non-fiction writers, editors, cultural figures, think-tank researchers, analysts, and other opinion-makers. For Florida, these people produce new forms or designs that are readily transferable between different contexts and, thus, widely useful. A theorem or strategy, for example, can be applied in many cases. Finally, in addition to problem solving, such work may entail problem finding.

- **Creative professionals:** This group works in a wide range of knowledge-intensive industries such as high-tech production, financial services, health care, and business management. Creative professionals are engaged in creative problem solving, drawing on complex bodies of knowledge to solve specific problems. The creativity of this stratum, in short, is applied.

The second distinctive dimension Florida claims for creative capital is a quality of place. Finance and human capital, the antecedents of creative capital, include a spatial dimension insofar as location is a function of agglomeration effects and transport efficiency. Space here is a force of production. Florida’s creative capital extends consideration to the quality of places. These qualitative dimensions, he argues, are themselves capital assets in that creative people can only be creative if they live in areas with such characteristics (Florida, 2002, p. 223). The established view of the relationship between capital and labor is, to invoke an image: if you build production capacity workers will come. Florida reverses the conventional direction of causality. The dynamic of creative capital, he suggests, is: if talent is here, production capacity will be built.

**What Are Creative Industries?**

The definition and scope of creative industries used by researchers varies (Flew, 2002). Early work in this area centered on the activities identified by Caves (2000, p. 1) who considers creative industries in the following terms:

Creative industries supply goods and services that we broadly associate with cultural, artistic,
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or simply entertainment value. They include book and magazine publishing, the visual arts (painting and sculpture), the performing arts (theatre, opera, concerts, dance) sound recordings, cinema and TV films, even toys and games.

This set of activities was central to the substantial work that Scott (2000) has done in this area, and was the raw material that Hutton (2000, 2004) used to build a complex understanding of the links between activities of this kind and the internal structure of cities, especially the revival of parts of the inner city of some metropolitan areas. O’Connor (1999) explored the location of this activity in Australia and found very substantial concentration in Sydney, which he attributed to some significant infrastructure as well as the availability of an array of support services. Gibson’s (2004) research confirms that perspective showing Sydney’s position as Australia’s pre-eminent creative city is attributable to the city having a critical mass in terms of important demand factors; significant connections to finance, property, and high-end professional services; significant infrastructure for creative industries; and significant social factors, including many of Florida’s (2002) creative class indicators. Gibson also has confirmed the importance of the sector, showing that for every 1 million dollars of investment in music, television, and film production well over 30 jobs are created. This compared favorably to other industry sectors. (Gibson, 2004). Federal government figures for 2000 suggested that creative industries account for upward of 3.3% of GDP (approximately A$20 billion per annum), with this figure expected to be significantly higher today.

The work done by Florida (2002) was grounded in an analysis of occupations and so opened up the idea that creativity (and by association creative industries) was something expressed in the special characteristics of the workforce. Although not connected directly, this approach had a lot in common with the focus on “knowledge workers” taken by Lambooy and developed further in a study of knowledge intensive business services by Simmie et al. (2002).

These approaches have come to explain creative industries as including “those activities which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property” (Department of Culture, Media and Sport, 2001, p. 5).

Cunningham et al. (2003, p. 6) has tried to bridge these two approaches by defining creative industries as involving activities that have their origin in individual creativity, skill and talent; have the potential for wealth and job creation through generation and exploitation of intellectual property; have creative intangible inputs that add more economic and social value than is added by manufacturing and encompass and link the traditional cultural industries (such as the performing arts) with the new economy “info-intensive communication and cultural industries” (such as computer game design).

The breadth of the latter two broader approaches is underpinned by ascribing links between creative industries and the knowledge economy and the new economy. So that creative industries are seen as “becoming increasingly important components of modern post-industrial knowledge based economies” (United Nations Educational, Scientific and Cultural Organization, 2006, p. 1) and, in particular, seen to be related to the rise of cultural industries, the significance of knowledge to all aspects of economic production, distribution and consumption, and the growing importance of the service sector. It is linked to the dynamics of the new economy, whose form is increasingly informational, global, and networked (Flew 2001, p. 1).

Although these perspectives risk being all encompassing by involving themselves with a catchall perspective of creativity they have become the more common way of approaching this activity. The value of this approach lies in its potential connections to the understanding of
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agglomeration, as the activities involved are very likely to be those where face-to-face contact is critical. Recent work on this aspect by Storper and Venables (2004) has shown that face-to-face contact needs to be seen as a deeper and more complex element in the way business is conducted as it carries the benefits of learning, and so product development and refinement as well as the aspects like trust and social network configurations identified earlier. If, indeed, creative activities are shaped in large part by the face-to-face contact, then the potential for locally specific policy to shift the activity probably is low.

As noted above, creative industries have attracted attention in Australia. The O'Connor (1999) and Gibson (2004) research established the concentration of the narrowly perceived creative activities. Effort applied to calculate Florida’s creativity index at a regional scale has provided insight on the broader perspective of this activity (National Economics, 2002). The latter effort found wide disparities in the creativity index with metropolitan regions generally scoring highly, while those further down the settlement hierarchy scoring much lower. This confirms output from a separate project that identified the spatially concentrated nature of the creative industries (The National Office for the Information Economy, 2002).

CREATIVE INDUSTRIES AND THE ECONOMIC GEOGRAPHY OF WORK IN METROPOLITAN REGIONS

This chapter seeks to explore this activity in a way that could begin to expose the reasons why these concentrations of the activity are so substantial. These reasons could then be integrated into an analysis of the policy thinking that seems to expect this activity might locate in smaller centers. This approach has a foundation in the structure of the settlement system, and utilizes knowledge of the patterns of work and industry location. It has something in common with research that has purported to understand the development of industry clusters or industry districts, but extends this approach by utilizing the geography of work to understand the economic ecology of a metropolitan area. Drawing on travel to work data, the approach utilizes measures of both the characteristics of workers and of jobs, and economic enterprises in locations to expose regional concentrations. It has a further refinement as it incorporates the links between work and residence. The latter adds some sense of the strength local labor markets have to the study. If the research finds that areas with creative industries have highly self-contained labor markets, it will suggest the concentrations of these activities are associated not just with production networks, but also with local residential communities, something that has begun to emerge in Hutton’s work and has played a part in Florida’s analysis.

The full methodology is reported elsewhere (Baum et al., 2006a, 2006b), and the broad analysis used is available from the authors. The analysis identifies a typology of localities across the six main metropolitan regions of Australia (Sydney, Melbourne, Brisbane, Adelaide, Perth, and Hobart), according to the characteristics of economic activity in those areas. The analysis identified eight clusters or groups of localities that share similarities in industry or job mix across the metropolitan regions.

The eight clusters were:

- CBD Business/Creative industry work cluster
- Secondary creative industry work cluster
- Secondary property and finance work cluster
- Manufacturing/distributive work cluster
- Manufacturing work cluster
- General work cluster
- Extractive work cluster
- Peri-urban extractive work cluster
The creative industries have a role in the industrial structure of three separate clusters of municipalities. The first cluster, the CBD business/creative industry work cluster, corresponds to areas with high scores on indicators, including the proportion of establishments engaged in creative industries, the proportion of business service sector establishments (finance, insurance, and property), high proportions of large firms (those employing more than 50 workers), high proportion of high-income workers, and commensurately high proportions of workers with at least a university degree and workers classified as professionals. The localities on average also had the highest shares of metropolitan region jobs. Although not a significant factor in this cluster, the localities had an above-average level of self-containment. The localities in this cluster are found in Sydney, Melbourne, Brisbane, and Hobart, and mainly in inner-city CBD locations.

The second cluster, labeled the secondary creative industry work cluster, comprises localities located in near inner-city suburbs and are found in Sydney, Melbourne, Adelaide, Brisbane, and Perth. Like the first cluster, this group of localities has high scores on indicators, including the proportion of creative industry establishments, the proportion of business industry sector establishments (finance, insurance, and property), the proportion of large firms, high proportion of high-income workers, and commensurately high proportions of workers with at least a university degree and workers classified as professionals. The difference relates to the size of the means for each indicator. This group has the second highest average of establishments engaged in creative industries and the third highest average on business services.

The final cluster associated with a significant presence of creative industries is labeled the secondary business/creative industry work cluster. Again this cluster has high scores on indicators including the proportion of creative industry establishments, the proportion of business services sector establishments (finance, insurance, and property), the proportion of large firms, high proportion of high-income workers, and commensurately high proportions of workers with at least a university degree and workers classified as professionals, and again the significant difference between this and the other two clusters relates to the averages on a number of indicators. This cluster has the second, highest average share of business services and the third highest on creative industries. The localities in this cluster are found in Sydney, Melbourne, Brisbane, Adelaide and Perth, and are primary located in near inner-city suburbs.

The remaining clusters had much lower levels of creative industry activity and were identified as two groups of localities with largely manufacturing and distributive industry functions located principally in middle suburbs and toward the urban fringe; two groups found on the peri-urban regions of the metropolitan areas that had functions closely associated with agriculture; and a final cluster that had no significant industry differentiating its function and had a low, average level of self-containment suggesting that the areas are largely residential.

These results have established that creative industry is primarily a large city function, and within those large cities generally is found in the inner city. To refine that insight further, two additional steps have been taken. The first involves a regional concentration ratio (Hill et al., 1980), a version of a location quotient. This will determine whether any of the clusters are over-represented in a given city. The RCR is calculated by considering the percentage distribution of a particular cluster in each metropolitan region divided by the percentage distribution of that cluster across all metropolitan regions. Like a location quotient, a RCR greater than 1 indicates that the cluster is overrepresented in the region, while an RCR less than 1 indicates the cluster is underrepresented. The figures for the RCRs across the eight clusters
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are presented in Figure 1. What becomes clear from this figure is the overall dominance of Sydney in terms of creative industries clusters, with a RCR greater than 1 on all three of the clusters characterized by creative industries. Melbourne, Perth, and Brisbane are prominent in some of the clusters associated with creative industries. The remaining metropolitan regions have much lower presence in the creative industry sector.

THE REGIONAL DISTRIBUTION OF CREATIVE INDUSTRIES

The second step taken to explore the location pattern further involved an analysis of the location of creative industry category. The data we present in this section comes from the Australian Bureau of Statistics Integrated Regional Database and focuses on the location of industries across broad statistical regions (statistical sub-divisions). It considers location quotients for the number of firms engaged in creative industry sectors and uses the definition outlined earlier. The location quotient allows us to understand the extent to which a region has a greater or less than average concentration of creative industry firms.

Figures 2 and 3 present the top and bottom 20% of statistical sub-divisions (SSDs) by location quotient. The data confirms that concentrations of creative industries are, for the most part, located in metropolitan regions, but it draws special attention to the larger metropolitan regions of Sydney and Melbourne, as well as Canberra. Sydney has eight sub-divisions (approximately one-fifth of its total of these units) in the top 20% of its share of creative businesses. More significantly, these eight account for over 60% of the total sub-divisions in the Sydney metropolitan region and 20% of the total sub-divisions in New South Wales.
Figure 2. Location quotient: creative industries; bottom 20% statistical sub-divisions.

Figure 3. Location quotient: creative industries; top 20% statistical sub-divisions.
Melbourne has 10 sub-divisions in the top 20%, which again account for approximately 60% of all the sub-divisions in Melbourne. Other cities have smaller shares of creative industries location, and this is particularly evident in the smallest capitals of Adelaide and Hobart. Adelaide has only one SSD in the top 20%, and Hobart does not feature any at all. Outside of the metropolitan cities, only one SSD (Cairns City in Far North Queensland) features in the top 20%. No metropolitan region feature in the SSDs located in the bottom 20% of the distribution. The localities listed here have been identified elsewhere (Department of Health and Aged Care 2001) as being among Australia’s most remote locations. The fact that Sydney and Melbourne have the largest location quotients for creative industry firm locations reflects the position they have in the broader Australian economy, and the historical leadership they have had in Australian urban and regional development. Sydney, in particular, is Australia’s undisputed global or world city and has a dominant role in Australian business service activity, and is the choice of headquarter location for the majority of Australia’s large international media corporations (Connell, 2000).

CONCLUSION

It should be clear from the discussion above that the economic geography of creative industries in Australia is spatially concentrated in particular regions, and most importantly largely in the inner city parts of the larger metropolitan and urban areas. This outcome is consistent with a large body of research both within Australia and internationally that identifies that major metropolitan centers continue to drive the worlds of creative production (Scott, 2000; Gibson et al., 2002; Florida, 2002; Musterd & Deurloo, 2006). The explanation of this outcome is often considered in terms of the urbanization and locational agglomeration economies present in these large cities, which are articulated through the presence of appropriately skilled labor, infrastructure, substantial local and global markets, and the presences of ancillary industry sectors. While many, if not all, localities may have some form of activity that is classified as creative industries, these locations are small relative to the activity within the large places. This spatial pattern of creative industry clusters raises a number of issues regarding the potential success of broader, regional development frameworks seeking to change the distribution of creative industries.

One prominent result of the clustering was the tendency for high levels of creative industry to correspond with high levels of measures of human capital and the skill base, consistent with previous research in this area. (Florida, 2002; Scott, 1996, 1997, 2000). So it could be that the biased economic geography of creative industries could be a product of the uneven geography of human capital. In research conducted in 2004, Stimson et al. (2004, p. 380) illustrated how:

In Australia there is a dichotomy at a general aggregate level between the capital cities and the regional urban areas in performance with respect to work, employment and skills, and in particular for human capital performance. The capital cities generally are shown to have higher levels of performance, and especially for university qualifications and participation.

Importantly, for this chapter, they go on to argue “that city/regional differentiation is seen as well through the digital divide and also in the incidence of jobs in the knowledge based and information intensive occupations and industries with their higher skill requirements” (Stimson et al., 2004, p. 380). This means that some places, mainly in non-metropolitan Australia, will lack the enhanced human capital requirements that may be required for creative industries to prosper.

The focus on the right kinds of labor was the focus of the arguments behind Florida’s (2002)
creative class. In short, localities could strengthen their ability to attract creative industries and consequently gain a more substantial part of the new economy pie, if they could successfully lure the creative class to their town or region. The policy message is that regions and locations should plan to attract members of the creative class. Within the Australian context, this has been the outcome of the “State of the Regions” report mentioned earlier. Within the report, the authors argue that creative policy is required to develop the preconditions for market conditions to work. Planning is...required to i) reallocate resources in terms of physical and human infrastructure capital to give the lagging regions opportunities to move up the competitiveness rankings; [and] ii) ensure that the local and political institutions are in place ... so as to ensure that resources transferred to a lagging region are used to creative attractive, diverse, open societies, which are so important for success in the innovation focused global economy (National Economics 2002, p. 127).

Leaving aside the question as to the extent to which people follow jobs or jobs follow people, a serious question remains regarding the extent to which some regions in the settlement hierarchy can successfully hold, let alone attract workers with the right skills and human capital. While it remains true that large cities (predominately on the eastern seaboard), and some urbanized non-metropolitan coastal settlements, are able to a large extent maintain population and importantly population of working age with significant skills, there are a number of localities suffering from population decline and a potential brain drain. This has been identified as a significant problem for the state capitals Adelaide (South Australia) and Hobart (Tasmania), and is a concern in terms of the goals of continuing to develop creative industries in these states and, more importantly, these capital cities. In South Australia, the government has identified the brain drain as a significant impediment to not only the potential to further develop creative industries but for wider economic development as well (Hugo, 2004). Attempting to redress this issue, the South Australian government introduced a policy named the “bringing them back home program” with the aim of encouraging expatriates to return back to South Australia, and one would imagine the state capital of Adelaide. A similar issue faces Tasmania with the government identifying the need to attract population with the right skills to help develop the “new Tasmania” (Prins, 2005). Outside these two state capitals, the question of population loss and a brain drain is also impacting on smaller regional areas in decline (Baum et al., 2005). This is occurring in traditional agricultural areas as well as localities that were once associated with manufacturing industries and that are now trying to reinvent their local economy (Baum et al., 2005; Salt, 2001; Gray & Lawrence, 2001).

The question for regional development practitioners has to be: can these places, especially the smaller declining remote regional areas, ever expect to compete with larger cities in terms of being able to attract and retain skilled labor necessary for them to participate in the creative industry sector in a meaningful way? The answer from some would be that the government should plan to reallocate resources so that necessary investment will be able to move to these places, and hence help them move up the creativity index rankings and develop innovative and creative hubs locally. The lure of the bright lights of cities such as Sydney and Melbourne is substantial—research by Hugo suggests that a substantial number of young South Australian graduates move to Sydney, Melbourne, and Canberra for the more cosmopolitan life style offered in these places (Hugo, Rudd & Harris, 2001)—and the ability of places further down the settlement hierarchy to become hip enough to attract the best and brightest may be limited.

There also may be a question regarding the extent to which the current state of play, as identified here in terms of the economic geography of creative industry clusters will be likely to change. As was noted, the most significant concentra-
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tions of creative industries are located in major metropolitan regions and, in particular, Sydney, Melbourne, and Canberra, but also in particular regions within cities. Much contemporary economic geography literature makes the point that creative industries cluster in major urban areas due in part to the availability of infrastructure (as noted above), but also because of other urbanization economies such as availability of strong local and global markets (some of this is, of course, linked to the point above), and institutional thickness. The well-known work of Porter (1998, p. 90) suggests that “the enduring competitive advantages in a global economy are often heavily localized, arising from concentrations of highly specialized skills and knowledge, institutions, rivalry, related businesses and sophisticated customers.” In this case, city size and density matter, and this may be a significant issue for those places further down the settlement hierarchy. Large cities have a significant “innovation milieu” and the cumulative nature of knowledge associated with this milieu may make it difficult for lagging regions to compete (Fratesi, 2002). In addition, large cities allow the necessary institutional thickness to develop, which allows for the necessary web of supporting organizations to be in place, and helps “to create synergy and a collective sense of identity and purpose within a cluster” (Bassett et al., 2002, p. 174; see also Amin & Thrift, 1995; Scott, 1997, 2000). Any change that we do see is likely to come from the larger cities strengthening their position rather than relinquishing it. This may be especially the case as cities such as Sydney and Melbourne vie to become Australia’s first, truly knowledge city (Yigitcanlar, 2005). In this case, one can expect that there is an inevitable momentum in terms of metropolitan concentration, and the prospect of the economic geography of creative industries changing dramatically is questionable leading to some serious issues for regional development practitioners (Gibson & Klocker, 2005).

Associated with this point is the issue of the embedded history and culture of a particular city. Simply attempting to lure creative class types will not be enough. Peter Hall argues that developing a creative city or region does not work like that and that the historical track which a city finds itself on is important. Moreover, as Musterd and Deurloo (2006, p. 81) argue “airports or links to the electronic superhighway can be established almost anywhere, but the right …atmosphere or a particular cultural setting are much harder to create.” In reality, developing creativity in a city or region is not simply a case of “scattering the notions of tolerance, openness and diversity” over a city or region, developing creativity “is a lengthy and often agonizingly slow process that, while succeeding in some places, will fail absolutely in others” (Musterd & Deurloo, 2006, p. 81; see also Bassett et al., 2002).

So what does this suggest for broader regional innovation and the development of creative industries? At the top of the settlement hierarchy, the main urban/metropolitan regions, and especially Sydney, Melbourne, and Canberra are likely to be the key localities in terms of creative industries presence. These key players with their global links, significant markets, and relatively deep and internationally significant clusters will remain the leaders in terms of creative industries. The reasons identified here include the already established clusters and the established local links to ancillary industries and businesses, and the ability of these places to attract and retain the right types of labor and skills. Other urban and metropolitan regions, including the cities of Brisbane and Perth will potentially further develop their creative industry presence, especially as these places are among the population hot spots of the nation. This is not to say that there will not be barriers to development that will need to be addressed. One in particular that has received considerable attention recently has been the issue of declining housing affordability and the ability for localities with high housing costs to attract key workers. The key worker issue has been addressed by Yates et al. (2005), Yates and Wood.
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(2005), The Greater London Authority (2001), and Monk and Whitehead (2002). With direct reference to creative industries, Musterd and Deurloo (2006) identify housing affordability issues as being a significant barrier to the development of Amsterdam as a creative knowledge city. Similar concerns could easily be expressed in the case of Sydney or Melbourne.

Further down the settlement hierarchy we can expect mixed outcomes. There will be some regional success stories. Some places will be able to develop on already established creative industry presence. Gibson (2004) provides examples of successful outcomes including localities on the far north coast of New South Wales that have successfully transformed into creative industry hubs focused on music production and related activities. The region hosts the world headquarters of the School of Audio Engineering in Byron Bay, which offers programs on sound engineering and filmmaking. Other localities may be able to enlist smart policy, such as the use of inter-regional networks to lever opportunities to seek wider markets and hence short-circuit the issues of market access, and to develop the necessary institutional thickness at a regional level. There will be others who will be unable to significantly join the universal creative industries bandwagon. For these places, other niches need to be developed based on their relative comparative advantage. These places need less creative industry hype and more creative policies to lead to positive outcomes.

FUTURE RESEARCH DIRECTIONS

The process of understanding the role that creative industries have in economic and social development remain an important and exciting area of academic and policy research. Future research directions may well focus on understanding the best policy options available to attract and retain knowledge industries to a particular region, and on how best to achieve positive economic outcomes in regions that are unable to attract these types of industries. Exemplars of regional best practice need to be further identified so as to strengthen the case to pursue a creative industry policy. The types of research outlined here could be extended to account for a more fine-grained approach to understanding the role of creative industries in regional, and city economic and social development, and further extended temporally as new data becomes available. Moreover, attached to the understandings of creative industries is an understanding of the types of workforce associated with creative industries and the types of urban form and amenity these creative workers desire. The work by Florida of course deals with this, but there still is significant room for a fuller understanding of the broader interactions occurring between creative industries, creative workers, and social and economic policy and planning.

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Chapter IV
Knowledge Economy in Transition: The Case of Singapore

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ABSTRACT

This chapter presents Singapore as a case study for the management of change as Singapore transits from a knowledge-based economy to the creative economy. Analysis of the knowledge-based economy suggests that competitive advantage is increasingly derived from investment in intangibles, particularly, information and knowledge-based competencies. The film industry is chosen as a microcosm level of analysis to examine the state of the creative economy as the latest phase in Singapore’s economic development as technology and information are increasingly used to navigate and mediate its people, resources, and capital. The objective of this research is to examine the types of competencies that enable firms in the industry to stay competitive in the contemporary knowledge-based economy in the light of technological development in the industry. In so doing, it seeks to shed light on what matters for the industry and the role that government has in shaping the creative economy.

INTRODUCTION

In the so-called knowledge economy, also variously known as knowledge-based economy (KBE) and new economy, knowledge-related activities have become central to creating employment, national wealth, and sustaining economic growth (Ofori, 2003). The sustenance of these activities requires a constant renewal of human and organizational capacities and creating conducive environments for creativity, innovation, learning, and change to thrive (Knight, 1995).

Singapore’s commitment to KBE development in the past decade has enabled it to make a rapid
and successful transition to a newly industrialized economy. Since the late 1990s, the Singapore government has forged an environment that is conducive to innovations; new discoveries; and the creation of new knowledge; and one that harnesses the intangibles, such as ideas, knowledge, and expertise to add value and create new value in the light of the knowledge-based economy (Ministry of the Arts and Information, Renaissance City Report, 2000). The Singapore experience represents one of few examples of how knowledge can become the driving force of economic growth and transformation as it was listed as one of the most information and communication technologies (ICT) specialized economies in the world having being ranked amongst the top 10 highest Knowledge Economy Index (KEI) in the World Bank comparisons (Knowledge for Development: World Bank Group Web site).

In the early 21st century, Singapore also recognized that creative industries including motion picture, television, and digital media production industry are fast-becoming powerful engines driving economic growth (UNCTAD, 2004). The significance of the creative industries worldwide is indicated by the mapping documents and strategic policies undertaken by various countries targeting at the growth of such industries. These include: UK Creative Industries Task Force (2001), America’s Cultural Capital (2001), Creative Industries in New Zealand (2002), State of the Regions Report, Australia (2002), and Baseline Study on Hong Kong’s Creative Industries (2003). The creative industries have become one of the fastest-growing sectors in the U.S. and global economies (United States Census Reports, 2000) showing annual growth rates of between 5% to 20% (Creative Clusters, 2004). This growth is fuelled, in part, by the increasing convergence between the spheres of culture and economics (Scott, 2000) and, in part, by the nature of the knowledge, creative, and symbolic assets of creative industries (Jones, 2005).

Having invested heavily in ICT, the Singapore government is now keen to use content and creativity to enter the next wave of development. This has prompted the development of the Creative Industries Development Strategy to enable Singapore to compete in the global knowledge economy aiming to nurture Singapore as a creative centre (ERC Report, 2002). In recent years, efforts were made to tap the economic aspects of culture, which has become the “primacy of the state’s agenda” (Kong, 2000, p. 419) for the arts and creative industries.

Analysis of the knowledge-based economy suggests that competitive advantage is increasingly derived from investment in intangibles, particularly information (Galloway & Dunlop, 2007, p. 25). The film industry is one of 13 sectors that make up the creative industries (DCMS, 1998) and has been defined as typical of the intangible, information-intensive growth sector deemed to characterize the contemporary knowledge or network society (Castells, 1996). It has become closely associated with industries in the new economy portraying a project-based nature, organized as networks of knowledge, and creativity-based teams and individuals (DeFillippi & Arthur, 1998). As such, intangible resources, such as reputation, experience, and particular skills (e.g., creative and functional skills) will assume greater significance as they are truly rare and can be more difficult for competitors to imitate (Itami, 1987; Rao, 1994).

This chapter presents Singapore as a case study for the management of change as Singapore transits from a knowledge-based economy to the creative economy. Singapore makes for an interesting case study because its status as an intelligent city (IDA Press Release, 1999) and the world’s most networked-ready country (World Economic Forum Global Information Technology Report, 2004-2005) provides valuable insight into how public policies have successfully negotiated the current global network economy to suit economic
changes. Historically, technocrats and economists have carefully planned the industrial restructuring of the economy since its independence in 1965, and the country has been very much socially engineered to suit economic needs and global challenges.

The question remains whether or not Singapore is able to negotiate the paradigm shift from a city-state with an image of conservative ideology and strict censorship to one that involves a free-spirited dynamic creative hub in the making, especially when Singapore’s current development utilizes technology and information to navigate and mediate its people, resources and capital (Yue, 2006).

The film industry is chosen as a microcosm level of analysis to examine the state of the creative economy as the latest phase in Singapore’s economic development. Like many other industries, the film industry is undergoing significant changes driven by technology and innovation, and it has become ‘knowledge-based’ in the sense that its products rely more on intellectual capital and information rather than materials or physical resources” (PMSEIC, 2000, p. 3).

The objective of this research is to examine the types of competencies that enable firms in the film industry to stay competitive in the contemporary KBE and to identify issues and opportunities arising from the increasing use of digital technologies. In so doing, it seeks to shed light on how government has a role in influencing and shaping the industry. The chapter seeks to address the following questions: To what extent are knowledge-based competencies in the film industry affected by the advent of digital technology? What is the role of government policies in shaping the industry and what implications would this have for Singapore in its transition from a KBE to a creative economy?

The nascent development and emphasis given of the film industry in recent times means that the findings and conclusions of this research would be somewhat speculative because the industry’s major players are only just starting to confront the issues and opportunities surrounding this industry. However, it should be possible to draw some firm conclusions on the most likely implications, opportunities, and limitations over the short to medium term.

This chapter is organized into the following sections. The next section provides a background to the state of Singapore’s KBE and its progression into the creative industries development phase with particular emphasis given to the film industry. The second section provides a glimpse of the Singapore film industry since post World War II period and how digital technology has made an impact on the industry in the 21st century. This is followed by how the research was conducted, and a discussion and evaluation of the current state of the film industry. Toward the end, the section discusses conclusions and prospective research.

BACKGROUND: CONCEPTS AND ISSUES

Singapore As A Knowledge-Based City

The OECD (1996) defines a knowledge-based economy as one in which the production, distribution, and use of knowledge are the main drivers of growth, wealth-creation, and employment for all industries. In that regard, many authors identify ICT and globalization as key drivers of the knowledge-based economy (Economic and Social Council, 2000). It has been established that successful companies are those that consistently create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products (Nonaka, 1991).

Foreign direct investment (FDI) has been an important factor in Singapore’s economic competitiveness (Chia, 2000) and its success as a KBE. Singapore adopts a liberal FDI policy that saw the
establishment of 6,000 multinational companies (MNCs) set up their operations in Singapore (EDB Media Releases, 2003). As such, Singapore continuously has relied primarily on knowledge transfers through MNCs and foreign talents (Toh et al., 2002). This was promoted through investment by global companies and leveraged to generate direct and multiplier economic growth (Wong, 2004).

The Economic Development Board of Singapore (EDB) recognized the need for Singapore to compete in the global economy with a broader knowledge-based economy. The 1998 Report of the Committee on Singapore’s Competitiveness (CSC) and the EDB’s Industry 21 Master Plan set the vision for Singapore to become a globally competitive KBE.

The knowledge-based industries in Singapore have so far contributed to a rising increase in the GDP from 48% between 1983 and 1985 to 56% in 2001 (APEC Economic Committee Report, 2003). To that extent, Singapore’s efforts in creating a KBE through knowledge acquisition and dissemination within the last decade have been a commendable effort (Wong, 2004). Although knowledge transfer has provided a significant share of the innovation, activities and knowledge spill-over in Singapore, the challenge lies in the creation, ownership, and exploitation of new knowledge by the local entrepreneurs. This high lack of a critical mass of indigenous entrepreneurial firms for the global economy (Wong, 2004).

Toh et al.’s findings (2002) indicated that the mapping of Singapore’s KBE has highlighted the need for more entrepreneurs to create new business models, and the challenge for existing firms to innovate. Statistics released by the Global Entrepreneurship Monitor (GEM) 2005 report shows that Singapore lacks behind the OECD countries in starting a business (in general) as a career choice—46.8% versus 55.4%, and 57.8% of Singaporeans believe that new business success is accorded with high status in the country, compared with an average of 66.2% in the OECD countries (Wong et al., 2005). Only 29% perceived they have the skills to start a business, and a low of 17.5% who believed that good start-up opportunity exists (Wong et al., 2005). Singapore was ranked 17 among 24 countries with an entrepreneurial established business prevalence rate of 4.8% compared to New Zealand’s number one ranking of 9.6%, and the average of 6.2% for the 24 OECD countries (Wong et al., 2005).

Overall, the social and cultural attitudes in Singapore toward entrepreneurship are much lower than the overall averages for all the OECD countries (Wong et al., 2005), and this reflects a rather conservative perception where entrepreneurship is concerned. The weak entrepreneurial spirit is attributed to a prevailing culture that seems to discourage creativity, risk taking, and failure (Wong et al., 2004). This might have implications for Singapore trying to transit to the creative economy.

Singapore and the Creative Industries

What creative industries have in common is that they all use creativity and cultural knowledge to produce products and services with social and cultural meaning (Engelhard, 2005; Towse, 2001). Frith’s (1991) cultural economic policies (which include industrial cultural policy, tourist cultural policy, and cosmetic cultural policy) are evidently illustrated in the way government policies and strategies are structured to exploit the economic potential of the creative industry.

For instance, local production of cultural goods, such as film, digital media, recorded music, theatre, dance, performing arts, visual arts, music, fashion and design are often selected to perform overseas for image promotion both for the artistes as well as the country as a city of the arts (Kong, 2000). The urban cosmetic form is displayed by the numerous initiatives taken by the state institutions to generate artistic activ-
ity throughout the country since 1989. The total number of performing arts activities and visual arts exhibitions increased by some 170% from about 1,700 in 1989 to some 4,600 in 2001 (ERC Reports, 2002). Ticketed attendance for performing arts increased by 67% from 562,000 in 1989 to 940,000 in 2001, an average of 2,575 ticketed patrons a year (ERC Reports, 2002).

The Department of Statistics in Singapore has estimated the value of Singapore’s creative cluster to be around 3% of gross domestic product (GDP) and this currently lacks behind that of the U.S. (7.8%), UK (5.0%), and Australia (3.3%) (ERC Reports, 2002). The latest economic figures indicated that in 2004, Singapore’s creative industries contributed to 3.6% of GDP and have a total value-add of S$6.7 billion. Although the creative industries had grown 7% annually, compared to 4% for the general economy (MICA Press Statement, 2005), Singapore still has a long way to go in establishing itself as a Renaissance City of the arts.

**Singapore and Creative Industries Development Phase**

The increasing convergence of the creative industries with the economic sphere, calls for a remaking of Singapore, whereby resources, in particular human resources, will be evaluated and engineered to create the desired economic outcomes. To propel the growth of Singapore’s lack-luster new creative economy (Leo & Lee, 2004), the Creative Industries Development Strategy was a pragmatic outcome of findings conducted by the Economic Review Committee (ERC) in 2002 to enable Singapore to compete in the global KBE (ERC Reports, 2002). The strategy includes a three-pronged approach comprising Renaissance City 2.0, Design Singapore, and Media 21, which aim to double the GDP contribution of creative industries cluster to 6% by 2012 (ERC Reports, 2002). Specifically, the Media 21 blueprint seeks to transform Singapore into a global media city and to increase the GDP contribution of the media cluster from the current 1.56% to 3% in 10 years (MDA Web site).

The film industry has been defined as typical of the intangible, information-intensive growth sectors deemed to characterize the contemporary knowledge or network society (Castells, 1996). The rapid advance of digital technologies and the globalization of networks have made these information-based products one of the fastest growing in the world (Pratt, 1998). Hence, the film industry in Singapore has been an area of focus in the last one to two years.

In 2003, the Media Development Authority (MDA) was formed with the merger of the Singapore Broadcasting Authority, the Films and Publications Department, and the Singapore Film Commission (SFC) to develop Singapore into a vibrant global media city as well as a creative economy and a connected society. There is a realization that the new economy requires a stimulating, non-repressive climate conducive to imagination, innovation, and adventure in order to attract and retain global talents, which have become very mobile.

**The Singapore Film Industry**

Singapore had a golden age of cinema in the 50s and 60s, especially in Malay films (Uhde et al., 2000). The period after Singapore’s independence in 1965 saw a decline in film production. The next 20 years saw the Singapore government focusing mainly on economic development. Singapore probably was the only country in Southeast Asia without a filmmaking industry of its own in the 70s and the 80s. In the 90s, things began to change. An unprecedented growth in cinemas in the form of multiplexes (Uhde & Uhde, 2000) and the establishment of Picture House (a cinema that screens art house movies) to provide a mix of art house and commercial movies has made feasible the establishment of a domestic film production industry. Hence, in the 1990s, the government’s
efforts to expand the services sector included identifying filmmaking as a service industry and a potential economic growth area.

The MDA has set aside S$25 million for film development in Singapore to help the local film industry to grow and is targeting about 15 to 20 locally produced films annually (Singapore Film Commission e-Bulletin, 2003).

MDA together with the Infocomm Development Authority of Singapore (IDA) are, therefore, taking the lead to develop the film and animation industry. For instance, the establishment of Lucas Film Animation Singapore since 2004 is not only a great boost to the local digital animation sector but also will help to raise Singapore’s profile in this industry in the global arena. The studio in Singapore is Lucasfilm’s (USA) first outside of California and Singapore’s first digital animation studio by a well-known animation company.

**Competencies and the Creative Industries**

There is a lot in common between the creative industries and the KBE due to the emphasis given to creativity, knowledge, research, and development, investment in ICT, education, and training as the principal drivers of growth in 21st century economies (OECD, 2001).

In the KBE, the key to competitive advantage for a firm is to create and apply knowledge (DeCarolis & Deeds, 1999), which is recognized as the critical input in production and primary source of value (Grant, 1996, p. 112). It is in production when inputs are transformed into outputs where the issues of creating, acquiring, storing, and deploying knowledge become the fundamental activities (Grant, 1996, p. 120). This is where some basic distinctions are made regarding the types of competencies that can generate unusual economic returns (Hall, 1992; Miller & Shamsie, 1996) in the creative industries.

Research has shown that knowledge-based resources or competencies are likely to contribute most in uncertain, changing, and unpredictable environment, such as those prevalent in industries characterized by fads and fashion like the film industry (Miller & Shamsie, 1996; De Vany, 2004). These competencies are often tacit in nature and are grounded in experience (Polanyi, 1966/1997; DeFillippi & Reed, 1990) and reputation (Fombrun & Stanley, 1990; Itami, 1987; Rao, 1994). They remain viable under changing conditions and help firms adapt to a changing environment (Wernerfelt & Karmeli, 1987). Thus, they cannot be easily substituted or imitated (Barney, 1991; Mahoney & Pandian, 1992) and can be an important source of competitive advantage and project success (Miller & Shamsie, 1996).

As Singapore negotiates and transits from a knowledge-based city to a creative economy, there is a need to examine the competencies that will enable Singapore to successfully compete in the new economy. The technological and institutional environment will have an impact on how firms in the film industry successfully manage and develop these competencies.

The significant relationship between technology and competencies has been noted by Tushman and Anderson (1986) who argue that “major technological shifts can be classified as competence destroying or competence-enhancing, because they either destroy or enhance the competence of existing firms in an industry” (p. 442). Lundvall (2004) supports the same line of argument by stating that “introducing advanced technologies can only take place successfully when it is accompanied by organizational change and competence-building among employees” (2004, Abstract of paper). Hence the need to understand the types of competencies that enable firms in this industry to stay competitive in the contemporary KBE and, in particular, how digital technology would impact on these competencies.
**Digital Technologies and the Film Industry**

Firms in the film industry compete in a complex and challenging context in the 21st century that is being transformed by technological development, diffusion of new technology, and the development and use of knowledge (Hitt, et al., 1998). The introduction of digital technology in film production not only transforms the tools of production, but also merges processes and creates new hybrid forms where interactivity with the moving image delivers new audio visual experiences (Aiskett et al., 1997).

The realization that introduction of digital technology has had a significant impact on teams working in the film and TV production was revealed in a study conducted by the Australian Film, Television and Radio School (AFTRS) in 1997 (Aisbett et al., 1997), entitled “Talking Digital: Impact of Digital Technology on Film and Television Creative Teams.” In the United Kingdom (UK), the pace and impact of digital technology on filmmaking and film distribution also has led to a series of meetings staged in 1999 by the Department for Culture, Media and Sport (DCMS) and the Department of Trade and Industry (DTI) to focus on the industrial and creative implications of these developments.

“Digital technology offers a huge opportunity for the film industry and like the genie that is out of the bottle, no matter how hard you try, you can’t get it to go back in,” so said Lord Puttnam, who produced such classics as “Chariots of Fire,” “The Killing Fields,” and “Midnight Express” (Cass Business School Lecture, 2004).

**RESEARCH DESIGN AND METHODOLOGY**

The data gathering and analysis were done in an interactive process over a period of two years starting with two pilot studies conducted in Singapore and Australia, and the main fieldwork in Singapore. Interviews and online questionnaires were used variously in the three studies (see Table 1 in Appendix).

The findings of the first two pilot studies provided an overview of the film industry and were particularly useful in uncovering some key issues and challenges, where the impact of digital technology on the growth of independent filmmakers and the animation industry became first known. Due to the small size of the local market, many of the firms also popularly known as production houses are involved in the production of both feature films as well as animation films using digital technology in their production and post-production work. As a result, the fieldwork includes practitioners involved in film and/or animation production.

The research adopted a qualitative multiple-case study approach (Yin, 2003) with cross-case comparisons involving 35 practitioners in the Singapore film and animation industry. These are exemplary firms, which have made a mark in local productions as well as overseas collaborations. They represent mainly the small- to medium-sized firms with number of employees ranging from five to 150. Amongst those interviewed were five feature film production houses (coded as FF), 9 animation production houses (coded as AF), nine animation and feature film production houses (coded as FFA), and two independent film producers (coded as IF). The rest of the interviewees include key people in the various government and private institutions and training centers (see Table 2 in Appendix).

Case-study methodology was selected to expand an understanding of the range and breadth of the firms’ behavior in the industry and to provide an exploratory and descriptive understanding of the context and setting (Marshall & Rossman, 1995) necessary to generate propositions. Besides, it provides exploration of areas where existing knowledge is limited (Cavaye, 1996). Hence, the
primary data sources for the case studies comprised semi-structured interviews and an online questionnaire conducted with the firms in order to draw out the above areas of analysis.

DATA ANALYSIS

The data collected from the fieldwork in the film and animation industry in Singapore indicates the distinctive forms and types of competencies that allow production houses to stay competitive in the industry.

Reputation

In the case of the film industry, competence (in the form of experience) and the knowledge of the team members (in the form of good track record, judgment, and reputation) are fundamental for the movie’s success. About 95% (33 out of 35) of the interviewees indicated that the competencies found in the film industry are very closely linked to tacit knowledge based on the reputation, experience, creativity, and judgment of individuals. They stated that reputation is a fundamental resource for organizations in the film industry as “you are as good as your last work, your last film and that is the benchmark people in the industry judge you by” said one of the interviewees (FFA 2). Hence reputation is linked to a good product—either in the form of a good script, a good director/producer and/or having a well-known actor.

When we mention Nelvana, everybody sits up and notices as Nelvana is a very recognized leader in the animation industry. – AF 7

Most of the research shows that good reputation can significantly contribute to performance differences among organizations and can have some favorable consequences for firms, such as getting the best talents enhancing their access to capital markets.

It is hard for business like us not to have a name and expect to get projects. This industry like Hollywood is all about connections. It will carry a lot of weight in attracting good people when you have a good reputation. – FFA1

For example, if you have a very reputable producer-director, it is easier to get funding. What that means is that there is an unwritten rule about reputation because the person has a track record of producing good shows that sell. – FFA3

For instance, in the Singapore film industry, the box office success (S$3.03 million) of its first movie, “Liang Po Po—The Movie” in February 1999, established MediaCorp Raintree Pictures in Singapore and raised the profile of the company in the region (MediaCorp Raintree Pictures Web site). Since then, MediaCorp Raintree Pictures had a few collaborations with award-winning Hong Kong directors. The success of “Liang Po Po” also catapulted the status of its producer Eric Khoo, and the actor Jack Neo.

Experience

The findings suggest that there is a link between experience, knowledge, and collaboration. There is a lot of knowledge that is gained through experience depending on how much one observes in life as well as in the industry. In that sense, there is a
lot of learning taking place. Besides observation, collaboration in the form of co-production or joint ventures with foreign production houses also is seen as one way that local production houses can gain experience and different perspectives (knowledge). Such kind of knowledge, which is often tacit in nature and more readily transferred through the knowledge-bearers, namely people (Johnson & Lundvall, 2001) in the industry cannot be easily codified, and this competence represents one specific cluster of knowledge and competencies within what Lundvall defines as “the learning economy,” and which he proposes as characteristic of work in modern societies (Lundvall, 2001). Experience also is illustrated through the track record or portfolio of the individuals.

You really need to be able to draw from your life experiences and observation of life and tell them in a certain way. I feel that so much of the education system and culture undervalues this kind of tacit knowledge because it is so bottom-line all the time. - Independent Arts Centre

Definitely there will be some form of learning or knowledge transfer that takes place with collaboration. For example, knowing the business and understanding the market and also the intangibles such as establishing relationship and contacts. There is some know-how exchange amongst the crew members. And for some of us, it is learning about the difference in making end products. – AF 7

Track record is the key to the competencies needed in this industry – the portfolio is important. I will not be hiring based on paper qualifications but on the projects that the person has done. Yes, especially experience counts for good content. – AF 5

Creativity comes from within my own self – my experiences, exposure and things I see everyday, read about and the way I see it, where I see it, my point of view and my interpretation. The movie to me is about perspective. – AF 3

Creativity as seen through the eyes of the interviewees can be viewed in many angles and manifested in different ways. One producer defines it as having the courage to follow one’s instincts and is seen as subjective, spontaneous, and even arbitrary. Yet it is deemed an essential ingredient for a good product (in this case, a good story or script) to emerge. It originates from within oneself through one’s own experiences in life, points of view, and interpretations of things and people around us. Often it involves thinking out of the box to come out with a good story.

In a recent project organized by an independent arts centre, 3 independent filmmakers from Singapore and Malaysia were asked to take a train out somewhere and to make a film within 3 hours. The 3 Malaysian filmmakers utilized the time given and maximized the idea fully and came out with quite good stories. The 3 Singaporean filmmakers however did not maximize the ideas and came out with stories that do not require them to think out of the box. – Independent Arts Centre.

Creativity comes from within my own self – my experiences, exposure and things I see everyday, read about and the way I see it, where I see it, my point of view and my interpretation. The movie to me is about perspective. – AF 3

This competence can be nurtured and honed, and often thrives in an environment where there is freedom and space to unleash such creative ideas. One producer cautions against institutionalizing creativity, which makes it an “instant tree syndrome” that will be detrimental to the industry.

The industry can only succeed if it is accorded the time to grow – about 10 to 15 years. It cannot be an instant tree syndrome. The fear is that if institutionalizing creativity becomes an instant
tree syndrome, then the tree would be cut off if it does not have any gains. It has to be a long-term thing. – FFA 4

The creative people and their employers cannot take creativity for granted, as creativity needs to be honed. For example to tell stories that sell, one needs the discipline to find those stories to tell them. – FF 4

**Creativity and Censorship**

The issue of creativity is closely linked to censorship in the context of the Singapore film industry. Film censorship is a sensitive issue in Singapore. Though censorship has been relaxed in recent years through different categories of classification, belting, and zoning rather than outright bans (Malepart, 2005), it continues to exert an effect on people working in the creative industries like those in the film sector. A few producers circumvent the situation by exercising self-censorship in order to ensure that their films get shown on the screens. Others lament on the restrictive effects of censorship on creative ideas and see managing creativity as an oxymoron.

Managing creativity is actually an oxymoron. For instance the government tried to manage creativity by having censorship rules. We are too well managed in a structured environment. For instance a group of people who wanted to show films at the independent art centre has to apply for a permit to do so. This is putting a lot of barriers to people organizing themselves. – IF 2

I do not think that censorship prevents creativity. It might curb and restrict expression but it does not curb creativity. If you are creative, you can tell a story in so many different ways. – FF 4

**Digital Technology and Its Impact on Creativity**

The use of digital technology, such as high definition (HD) in film production, allows for more experimentation with films, which was never possible with the use of 35 mm films. In many cases, interviewees acknowledge the creative freedom digital technology provides to allow for more enabling and experimentation in production and post-production work. This has led to the democratization of films as more works were produced and created with lesser constraints.

In terms of execution—the shooting, post-production and delivery platforms have definitely made it easier in terms of workflows and creativity. What it has done it to enable more works to be produced and created with lesser constraints. – FFA6

In the digital realm, there is a lot of enabling and experimentation, in the sense that you can twit the colors, do composite of pictures etc. - Technology Supplier.

**Digital Technology As an Enabler**

“Technology does not operate in a vacuum,” so said one of the producers (IF 1). It is seen as a tool that filmmakers have to leverage on to reap its benefits. As such, many interviewees recognized digital technology as only an enabler and a means to an end as it is the competencies that individuals have that will craft a good story for a successful film. Therefore, the content of the script is important and ultimately it depends on how the final product is integrated together.

Digital technology does not necessarily contribute to making better films as a lot still depends on the story development, the craft (discipline),
the creative inputs and the resources involved.
– FF 4

DISCUSSION

The data findings show that interviewees generally support the view that advances in digital technology are seen as a positive influence for the film and animation industry as it allows for more experimental works by producers, extending the range of products and services available. As such, more and better films will emerge in the long run, and this augurs well for the emerging film and animation industry in Singapore.

The interviewees are aware of the impact of digital technology on film production and that the technologies and platforms associated with digital production and delivery in the industry are very much standardized (Preston & Cawley, 2004, p. 137) to the extent that they are determined by advances made in ICT and the changing global economy. One producer succinctly puts it: “It is something that we have identified and the need to adopt. So it is seen as an enabler and a means to an end” (FF 10).

Despite any emphasis that has been placed on the impact of new technologies, the findings indicated that it is peoples’ creative imagination and craft skills that form the core competence of a thriving film sector. They also unfolded the importance of learning the craft and grammar of the trade, and having to pay one’s dues to learn on the job. They also stressed that much of their content development was based on trial and error, gauging what worked and what did not work.

Hence the competitive advantage lies in having and applying knowledge-based competencies to create content that is distinctive—in the case of the film and animation industry that translates into a good story or script for film production. This suggests that, to a large extent, the performance of firms in the film and animation industry is driven not primarily by technical competencies (such as digital technology) but by knowledge-based competencies (such as experience, reputation, and creativity) that are used creatively to harness and apply these technologies to underpin the creation of distinctive content. The data findings draw out the following proposition, which is indicative of the film and animation industry:

Introducing digital technologies such as high definition (HD) in film making and animation can only take place successfully when it is accompanied by knowledge-based competencies building among employees to create distinctive content.

This finding concurs with the study conducted by Preston and Cawley (2004) on three Irish digital media companies, which similarly highlighted that content innovation in the publishing industry, was not based primarily on standard scientific or technical knowledge. Much was dependent on human creativity and media-related skills (such as authoring and design, editorial) and tacit forms of knowledge (such as inspiration, knowledge, expertise, and skills), which do not fit into an easily quantifiable frame (Preston & Cawley, 2004, p. 135). The parallel finding of the two sectors reflects the types of competencies that underpin the creation of distinctive content that are significant to the creative industries in the light of technological advancement.

EVALUATION OF THE CURRENT FILM INDUSTRY

Although film production in Singapore had reached a steady pace of producing an average of five feature films a year in the early 2000s, this is not yet the critical mass required for the industry to grow (Millet, 2006). There appears to be a lack of a strategic recognition of the economic importance of the film and animation industry by government in the last decade, and, therefore, these
have not been targeted as strategic industries to be promoted and, hence, not received the kind of preferential treatment accorded to the industries promoted by the government, such as information and communication technologies, biomedical science, and nanotechnology (Wong, 2004).

There still is a general lack of an entrepreneurial culture to encourage people to make a career out of filmmaking. The nature of the industry being high risk and uncertain reinforces the cultural stigma of failure and propensity to play safe by establishing careers in multinational corporations and the public sector (Low, 2005).

The environment for filmmaking and production is far from conducive. “You have a situation where art has not caught up with life. Usually art reflects life but if so much censorship is taking place, then art doesn’t reflect life anymore” (World Socialist Web site, 24 April 2000)—these words aptly sum up the environment in which filmmaking and production is carried out in Singapore. Such kind of control does impede artistic and cultural development.

Singapore faces a shortage of local creative manpower especially those with above-the-line capabilities such as director, producer, scriptwriter, director of photography, and key cast (NTU Survey, 2001). Training institutions are producing people skilled in the use of technology and equipments rather than the key skills required in film production.

CONTRIBUTIONS

The findings of the film and animation sector in Singapore are indicative of the types of competencies that underpin the creation of distinctive content in the creative industries. This study adds precision to the research on the creative economy as it highlights the types of knowledge-based competencies (such as, experience, reputation, and creativity) that are essential for production houses to stay competitive in the film industry. And that introducing digital technologies can only take place successfully when it is accompanied by such competencies-building among employees. The proposition could be investigated in other film industries or economies in other countries that are similarly undergoing changes forged by digital technologies.

 Practitioners in the field acknowledged that hand-outs and other incentives in themselves do not a creative economy make. Many argue for a greater focus on the wider cultural and aesthetic development of the city-state where social and cultural mind-sets would have to embrace individual creativity, diversity, and community-led initiatives. Such kind of a consideration has to filter through the different strata in society starting with the families, schools, workplaces, and the society at large.

The study contributes to a growing knowledge of the emerging yet fragmented film and animation industry in Singapore. Although there is much written about the historical development of films and cinema in Singapore (Uhde & Uhde, 2000; Millet, 2006), the organization and management side of production houses in Singapore has not been well researched. There is, therefore, a lack of consistent data about firm performance and industry characteristics over time. With the current impetus provided by government in Singapore in the media sector, this study is a good source of information to assist in the formulation of schemes and policies to enable the industry to stay competitive in the international arena.

CONCLUSION AND IMPLICATIONS

The results of the study have a number of implications for firms and policy makers. For a small and emerging industry in Singapore, there is a need for a more robust understanding of the types of competencies that produce distinctive creative
content underpinning the creative industries. This is because “the real assets of the modern economy come out of our heads, not out of the ground: imagination, knowledge, skills, talent and credibility” (Leadbeater & Oakley, 1999, p. 11). Time is of the essence for these competencies to develop and grow as “institutionalizing creativity will only produce an instant tree syndrome” (in the words of one producer, FFA 4), which might not last.

Being a small and emerging industry, this sector lacks a strong, historically formed voice represented by trade associations or guilds. Its fragmented identity means that it lacks the emotive power of other sectors such as those in the traditional manufacturing areas. Hence, there is a greater impetus for collaboration and community-building between firms and firms, firms and institutions in the burgeoning industry. Areas, such as sharing of resources (like specialized equipments and talented expertise), and building of platforms and structures (such as filmmakers’ guild or association) can help set the standard for the industry and in so doing can make a mark in the local film scene. A number of the respondents acknowledged the need for more local networking in facilitating learning, which allows the boundaries of an individual’s creativity to be pushed further, and this is where government can play an effective knowledge brokering role by bringing the different parties together.

Putnam’s work on “Making Democracy Work” (1993) highlights the importance of ties, networks and norms needed for individuals to learn to trust one another and engage in cooperative endeavors. The networks, shared values, and trust people acquired through interaction bring the appropriate knowledge together in the process of shaping and shifting their self-perception or identity to actively manage learning and change (Falk, 2001). When applied to the Singapore film and animation industry, this will go a long way in establishing a sense of identity and belonging to the burgeoning industry.

It is not sufficient for policy makers to only initiate schemes to assist the small- and medium-sized firms in the industry. Much understanding should be given to the creative process, which forms part of the social system, and that creativity is both a complex social process and individual activity (Csikszentmihalyi, 1996). There is a greater need to focus on the wider cultural and aesthetic development of the city-state as social capital development would become an important strategic factor for consideration in an industry characterized by complexity of organizations, scale of informational flows, and other technological developments.

Perhaps the new economy of Singapore can be gleamed and directed with a different lens through a broad multi-disciplinary perspective rather than a reductionist, engineering-based or systems approach. There is a need to open up the environment to stimulate the development of creative ideas. For policy makers, this argument may imply a complete turn of thought—looking at economic competitiveness as being served by a liberal cultural policy rather than a conventional policy of subsidizing business R&D, and supporting local spin-offs (Creativity and Innovation Management Journal, 2006).

**FUTURE RESEARCH DIRECTIONS**

This study focused on the firms’ competencies in the light of digital advancement. Although it captured the operational processes of the firms through the competencies and what government can do to encourage growth of the industry, it does not explain fully the wider influence of other factors like networking and relationship, which play a crucial role in securing contracts and work for the firm. Such is the balance that
production houses have to tread in order to stay competitive in the industry. Reacting to such a challenge requires a comprehensive understanding of the industry’s value chain (from production to distribution and exhibition), which will be the focus of future research and analysis.

Second, this study presents the views of most of the key filmmakers and animation makers in Singapore at one point of time and provides a good baseline for future research, as it is a cross-sectional rather than a longitudinal study. Follow up with firms in this industry after three years is planned for future work to track changes over time.

REFERENCES


America’s cultural capital: Art, culture and the national agenda. (Mar 2001). Centre for Arts and Culture, Washington, D.C.


**ADDITIONAL READING**


ENDNOTE

A feature film is a term the film industry uses to refer to a film shot in the movie studio made for initial distribution in theatres. The Academy of Motion Picture Arts and Sciences, the American Film Institute and the British Film Institute all define a feature as a film with a running time of 40 minutes or longer. Short films generally refer to films of between 20 and 40 minutes long. (Source: http://en.wikipedia.org/wiki/Independent.)
**APPENDIX**

**Table 1. Summary of methodology and field work carried out from 2004 – 2006**

<table>
<thead>
<tr>
<th>Fieldwork</th>
<th>Period</th>
<th>Where it was conducted</th>
<th>No. of interviews conducted / Type of interviews/ Interviewees</th>
<th>No. of online surveys conducted/Type of online surveys/Interviewees</th>
<th>Sources of contacts</th>
</tr>
</thead>
</table>
| Pilot Study 1 | Dec 2004 | Singapore | Six Semi-structured interviews:  
- Four feature film producers  
- Program manager of an independent arts centre  
- Cinema distributor and exhibitor who is also Chairman of the Singapore Film Society and a member of Singapore Film Commission | None | Singapore Film Commission (SFC)  
Web site  
www.sfc.org.sg |
| Pilot Study 2 | Jan 2006 | Australia | Two Semi-structured interviews:  
- Director of Communications and Public Affairs of a large film and animation production house in Sydney  
- CEO and senior compositor of a visual effects production house based in Adelaide, South Australia specializing in feature film, digital effects creation, 3D animation and providing unique software solutions for visual effects production | Four online surveys using APOLLO (ANU On-line Polling)  
Combination of closed and open-ended questions.  
- Head of post-production of a digital production company  
- CEO of a large international animation production house that has an office in Singapore  
- Director of Communications and Public Affairs of a large film and animation production house in Sydney  
- CEO and senior compositor of a visual effects production house based in Adelaide, South Australia specializing in feature film digital effects creation, 3D animation and providing unique software solutions for visual effects production | Australian Film, Television and Radio School (AFTRS),  
Centre for Screen Business. |
| Main Study | April-May 2006 | Singapore | 35 Semi-structured interviews (See Table 2 for organizations and profile details) | 35 online surveys using APOLLO (ANU On-line Polling) | Web sites of:  
Singapore Film Commission (SFC)  
www.sfc.org.sg  
Media Development Authority (MDA),  
www.mda.gov.sg  
Private and public training institutions, people working in the industry and who are involved in the industry. |
### Table 2. Case studies organizations and profiles

<table>
<thead>
<tr>
<th>Organization/Type</th>
<th>Year started/ No. of employees</th>
<th>Role of Interviewee</th>
<th>Secondary Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1 Feature Film &amp; animation (FFA1)</td>
<td>1988 &gt; 150</td>
<td>Producer</td>
<td>Corporate Web site, Singapore Film Commission Web site, company brochures, and press releases</td>
</tr>
<tr>
<td>Firm 2 Feature Film (FF1)</td>
<td>1998 20</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 3 Animation Film (AF1)</td>
<td>1995 30-40 in Singapore 150 in China</td>
<td>Executive Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 4 Feature Film (FF2)</td>
<td>2000 10-12</td>
<td>Creative Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 5 Feature Film (FF3)</td>
<td>2002 20-35 (project basis)</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 6 Animation Film (AF2)</td>
<td>2001 20</td>
<td>Managing and Creative Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
<tr>
<td>Firm 7 Feature Film &amp; Animation (FFA2)</td>
<td>2004 2 in Singapore 2 in New Zealand 4 in China 4 in Canada</td>
<td>Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
<tr>
<td>Firm 8 Feature Film (FF4)</td>
<td>2002 Free lance ranging from 45</td>
<td>Producer</td>
<td>Corporate Web site, press releases, MDA directory and Web site, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 9 Animation Film (AF3)</td>
<td>2005 2 local staff 3 expatriate staff</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures</td>
</tr>
<tr>
<td>Firm 10 Feature Film &amp; Animation (FFA3) (Australian based)</td>
<td>2004 43</td>
<td>General Manager</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 11 Feature Film &amp; Animation (FFA4)</td>
<td>2000 7 permanent up to 10 - freelancers</td>
<td>Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
<tr>
<td>Firm 12 Feature Film &amp; Animation (FFA5)</td>
<td>2006 2 permanent 3 freelancers</td>
<td>Managing Director/Producer</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
<tr>
<td>Firm 13 Animation Film (AF4)</td>
<td>1999 4 permanent 40 casual on project basis</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 14 Feature Film &amp; Animation (FFA6)</td>
<td>2005 8</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures</td>
</tr>
<tr>
<td>Firm 15 Animation Film (AF5)</td>
<td>2004 10</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
</tbody>
</table>
### Table 2. continued

<table>
<thead>
<tr>
<th>Firm 16</th>
<th>Feature Film &amp; Animation (FFA7)</th>
<th>1997</th>
<th>50</th>
<th>General Manager and Member of Singapore Film Commission</th>
<th>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 17</td>
<td>Animation Film (AF6)</td>
<td>2004</td>
<td>7 in Singapore 10 in Thailand</td>
<td>Creative Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures</td>
</tr>
<tr>
<td>Firm 18</td>
<td>Feature Film &amp; Animation (FFA8)</td>
<td>1996</td>
<td>15</td>
<td>Creative Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site</td>
</tr>
<tr>
<td>Firm 19</td>
<td>Animation Film (AF7)</td>
<td>1999</td>
<td>3-4 permanent 25 contract animators</td>
<td>Business Development &amp; Operations Manager</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures</td>
</tr>
<tr>
<td>Firm 20</td>
<td>Feature Film (FF5)</td>
<td>1998</td>
<td>7</td>
<td>Production Manager</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 21</td>
<td>Feature Film &amp; Animation (FFA9)</td>
<td>2004</td>
<td>20</td>
<td>Director of Creative Services</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures, Singapore Film Commission Web site</td>
</tr>
<tr>
<td>Firm 22</td>
<td>Animation Film (AF8)</td>
<td>Sales office since 1995/1996 Development Studio from Dec 2005 &gt;30 staff from all over the world including Korea, Japan, Taiwan, Singapore, Holland, Mauritius, Philippines and Canada</td>
<td>Director (Operations/Localization)</td>
<td>Corporate Web site, press releases, MDA directory and Web site, company brochures</td>
<td></td>
</tr>
<tr>
<td>Firm 23</td>
<td>Animation Film (AF9)</td>
<td>1997</td>
<td>5</td>
<td>Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site,</td>
</tr>
<tr>
<td>Firm 24</td>
<td>Supplier of Technology</td>
<td>2000</td>
<td>20</td>
<td>Director of Sales and Marketing</td>
<td>Corporate Web site, press releases, MDA Web site</td>
</tr>
<tr>
<td>Independent Film (IF 1)</td>
<td>2002</td>
<td>Producer and Director</td>
<td>Corporate Web site, press releases, MDA directory and Web site, Singapore Film Commission Web site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent Film (IF 2)</td>
<td></td>
<td>Independent Film Maker</td>
<td>Corporate Web site, press releases, MDA directory and Web site, Singapore Film Commission Web site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Institution 1</td>
<td>Government Institution 2</td>
<td>2003</td>
<td>Assistant Director Director</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site</td>
<td></td>
</tr>
<tr>
<td>Government Institution 3</td>
<td></td>
<td>Senior Officer</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Training Institution</td>
<td></td>
<td>Course Manager/Lecturer School of Film and Media Studies</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. continued

<table>
<thead>
<tr>
<th>Commercial Training Institution</th>
<th>Year</th>
<th>Position</th>
<th>Contact Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Arts Centre 1</td>
<td>1990</td>
<td>Artistic Co-Director</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site</td>
</tr>
<tr>
<td>Government Cultural Institution</td>
<td>1887</td>
<td>Assistant Manager for Programming</td>
<td>Corporate Web site, press releases</td>
</tr>
<tr>
<td>Cinema Exhibitor and Distributor</td>
<td>1992</td>
<td>Managing Director</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site, Singapore Film Society Web site</td>
</tr>
<tr>
<td>Independent International Short Film Distributor 1</td>
<td>2002</td>
<td>Manager</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commercial Training Institution</th>
<th>Year</th>
<th>Position</th>
<th>Contact Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Training Institution</td>
<td>2003</td>
<td>Managing Director and President of the Independent Television Production Companies (AIPRO)</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site</td>
</tr>
<tr>
<td>Independent International Short Film Distributor 1</td>
<td>2002</td>
<td>Manager</td>
<td>Corporate Web site, press releases, Singapore Film Commission Web site, MDA directory and Web site</td>
</tr>
</tbody>
</table>

Section II
Knowledge-Based Urban Development Strategies
Chapter V
The ALERT Model:
A Planning–Practice Process for Knowledge–Based Urban and Regional Development

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Michigan State University, USA

Kenneth E. Corey
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ABSTRACT

This chapter is presented especially for the use of practicing planners. Practicing planners, as intended here, are broadly defined and inclusive as a set of local stakeholders. Given the widespread need to develop an active civil society, it is important that representative local actors, and diverse urban and regional stakeholders engage in developing their communities intelligently over sustained long-term futures. Practicing planners in this context include, but are not limited to professional urban and regional planners. Citizens and other professionals, such as business persons, bureaucrats from all levels of government, employees from nongovernmental public organizations and their volunteers, and other individuals all have stakes in, and contributions to make to the development of their city-region in the relatively new context of a globalizing and increasingly knowledge-based world economy and networked society. The chapter, therefore, presents the background to these new development dynamics and it introduces the ALERT model. In the form of a conceptual framework, the model is a planning support system designed for the use of the diverse and wide-ranging stakeholder-planning practitioners who seek to engage planning in the steering of these new technology-enabled and knowledge-based development forces to attained desired outcomes. The ALERT model is not so much directly prescriptive, rather it is directional and relational with the intention that engaged planning practitioners will design and tailor their own planning processes to be responsive to local demand and need. At its best, the model can catalyze and stimulate the stakeholders to invent their own strategies that capitalize on the unique assets and development potential of the locality’s communities.
INTRODUCTION

This chapter is addressed to practicing planners. At the risk of becoming marginalized, planning practice needs to change. The practice of regional and urban development planning around the world in today’s environment of globalization and increasingly pervasive information and communications technologies (ICT) should be effective. To be relevant, it is imperative that the practice of such local, sub-national planning reflects this new increasingly knowledge-based environment. In this context, “practicing planners” as addressed here include professional planners, as well as individuals who are citizen planners, volunteer planners, and special-interest agents who represent the interests of businesses, governments, and other institutions in local-area strategic planning efforts of various kinds. All of these types of planning practitioners, therefore, need to acknowledge the recent important changes on cities and regions that are caused by globalization with explicit planning attention to information technologies and the enhanced knowledge generation that is facilitated by these technologies. The planning behavior of these various practicing planners should be reflective of, and proactively engage these new realities.

The principal aim of the chapter is two-fold: (1) to draw attention to needed new planning processes to foster urban and regional development for knowledge-based production functions, consumption functions, and quality of life amenities; and (2) to mobilize the strategic planning of effective, intelligent development by the principal stakeholders of city-regions throughout the global knowledge economy.

The chapter includes a definition for, and discussion of, next possible action steps for initiating intelligent development, and outlines a new local and regional planning process that builds on our collective current understanding of the global knowledge economy by addressing the practical question being asked increasingly by planners and their local development clients. They ask “now that I have an initial awareness and understanding of this new global economy, what can I do about it?”

The emergence of world cities and the growing global role of urban areas and urban institutional entities support our primary geographical focus on the city-region (Scott, 2001). This is the scale and level of development that is most congruent for local response to the environment and forces of globalization. Being informed by the ALERT model elaborated below can enable communities to be productive and more competitive within the new context of the global knowledge economy and network society.

By necessity, this brief chapter discussion is introductory. It is conceptual and therefore relatively abstract. There is little room here to provide the extensive empirical and concrete material in direct support of the organizing frameworks that are introduced. However, these critical evidence-based examples and elaborated working definitions are developed elsewhere. Refer to Corey and Wilson (2006) for a more complete examination of the ALERT model and its implications for more effective planning practice in the global knowledge economy and network society.

This chapter introduces the ALERT model. It is a new approach and a normative support system for regional and local planning practice in the global knowledge economy and network society. The acronym of “ALERT” is derived from the key words that define the content of the model: Awareness; layers; electronic-business (or e-business); responsiveness; and talk. The ALERT model is a decision support system that enables urban and regional planners and related development stakeholders at the city-region scale to plan and implement successful strategies for local knowledge-based development in the context of the global knowledge economy. The chapter is organized into two substantive parts. Part one provides background; it discusses a collective understanding of the global knowledge economy,
while part two is devoted to the specific practical and planned-staged actions that are framed by the ALERT model.

The style of this chapter is assertive. While this approach is not the norm generally adopted by many academics, we are unapologetic for adopting this style in this case. We have been fortunate in being able to travel and observe widely, indeed globally. We also have been able to drill down empirically, deeply, and selectively over a sustained time period. In attempting to bring together and integrate our diverse observations and reflections, we have revealed for ourselves patterns and associations that drove us to construct the frameworks that we introduce here. Further, we are compelled to share this normative construction because, as we have exposed it around the world, we have found that some planners and students of planning in the most generic sense of the word “student,” have resonated to our argumentation, illustrations, and applications. We believe that local planners are in the early and formative stages of struggling with the new transformative forces of globalization in its various forms. Consequently, we believe that there is value in sharing our early conclusions while we proceed with the next-stage development of our planning research and findings. The style of the chapter indeed is assertive, but over time, as we learn more and are able to become more systematically empirical and theoretically elegant, we hope to be able to continue to share our strengthening scholarly and professional results both with our planning colleagues in practice and in the academy.

BACKGROUND

This part of the chapter lays the groundwork for the ALERT model, with emphasis on the global knowledge economy. The model is premised on, and constructed from, contemporary empirical analyses and applicable development theories and concepts that are congruent with the complex relational world of the global knowledge economy and network society. This part of the chapter consists of three sections: change, concepts, and context.

Change

Some planners long have addressed the economic context for their work, but rapid changes in the nature and location of work, and workers introduce new forces that need to be recognized and accommodated in planned strategies. These trends can be discerned from recent global data and information sources, such as the International Telecommunication Union (ITU); the United Nations; Organization for Economic Co-operation and Development (OECD); and Internet World Stats, n.d., which may be used by regional and urban planners to demonstrate the pervasiveness of information and communications technologies-based networks that are distributed throughout much of the global economy. A review of global economic trends and technology usage data, especially as they apply to cities and regions, compel us to conclude that:

Planners face many new conditions in cities and regions, including (1) changes in production, with the shift away from manufacturing to services, and also toward advanced services and knowledge work; (2) the impact of information and communication technologies on how and where services are produced, and how people interact; (3) implications for social justice of uneven access to ICT; and (4) the potential change associated with ICT and globalization. The first task then is to develop awareness of the forces affecting our cities and regions, and then to use these forces for the development of our communities (Corey & Wilson, 2006, p. 34).

As an indicator of the preparation needed by workers in the future, the Bureau of Labor Statistics has estimated occupation growth for
The ALERT Model

the United States over the 2004-2014 period. Of the 30 fastest growing occupations, only seven can be achieved with on-the-job training; eight need an associate’s degree; 10 require a bachelor’s degree; and five a master’s degree or doctorate (Saunders, 2005). For the United States and the European Union (15 member boundary), the Organization for Economic Co-operation and Development (2004) calculates that one-fifth of all work is ICT enabled, with the most advanced economies in this regard being Luxembourg and the United Kingdom, which approach 30% of work as ICT enabled.

As structural change progresses in terms of what is made and how products and services are delivered, there also is a geographical restructuing with production systems fragmented to locate in the lowest cost and most advantageous areas. Saxenian (2006) and Friedman (2006) recently illustrated the production possibilities of an ICT enabled global economy. Organization for Economic Co-operation and Development (2006) estimates show that as much as 20% of white collar occupations could be affected by the offshoring of services due to ICT, principally driven by the declining cost of communications and computer technology, and the nature of information work.

From one perspective, the ICT-enabled economy offers many opportunities for economic growth, both in terms of new production as well as export-oriented growth for cities and regions in the developing world. The converse is that opportunity only will be available to those able to position themselves and their communities to be a part of the changing economy. Communities unable to offer educational opportunities to their residents, or unable to attract or grow firms, will be severely disadvantaged. The rate of change in how and where we work also will affect how well and where we live.

The challenge for planners is to adapt to these new conditions. Graham and Marvin (1996) point to the invisibility of ICT as one reason for its absence from planning thought and education. Unlike the physical presence of so many elements of planning, such as housing, roads, water and sewer systems, the elements of ICT largely are invisible and often ignored. Invisibility and change require continuous revisiting of fundamental principles of planning and the core mission of the profession, followed by changes in mind-set, if needed, to address the context of contemporary development planning.

Concept

Planning scholar, Bishwapriya Sanyal has written that the profession of planning faces major challenges. One of these is the need to construct planning theories to meet the needs of planning practitioners (Sanyal, 2000, pp. 317-333). The ALERT model for planning practitioners constructed and elaborated in the book, Urban and Regional Technology Planning: Planning Practice in the Global Knowledge Economy (Corey & Wilson, 2006), is intended to enable local planning practitioners to address this challenge by offering a theory-informed framework to enable planners to invent and tailor their own place-specific planned solutions and processes for knowledge-based urban and regional development. To meet and operationalize this challenge set out by Professor Sanyal, planners will need to apply the principles and lessons from the emerging and growing body of contemporary planning theory and practice—especially relational theory (Yeung, 2003; Yeung & Lin, April 2003).

In investigating institutionalist and governance approaches, planning scholar Patsy Healey has characterized relational planning as:

suggested within the evolving, complex, socio-spatial interactions through which life in urban areas is experienced... As itself constituted through an array of webs of relations within the intersecting complexity of the dynamics through which the futures of daily life experience of urban
areas are produced, the relations of the planning project jostle and get jumbled up with all kinds of other relations. It is within the complexity of this jostling and jumbling in specific situations that … interventions are both shaped and come to have effects (Healey, 2007, p. 11).

Why is theory important? And what is relational theory? Theory is important because it enables one to order more effectively, and therefore to plan better, the highly complex new mix of influences, such as globalization, information and networking technologies, and socio-economic functions that play out today and in the future at the scale of urban and regional areas. This body of theory demonstrates the value of perceiving and socially constructing these new development dynamics through knowledge-based lenses that reflect a world that increasingly behaves nonlinearly and operates across and within blended usually overlapping boundaries, rather than ones with sharp edges. These boundaries are functional in the meaning that their content relationalities are economic, political, social, cultural, as well as material, physical and environmental. These blurred boundaries also are spatial and scalar in the sense that the development functions of communities behave and perform locally, regionally, nationally, and globally. Polycentric spatial organization for example, captures such urban locational relationalities (Hall & Pain, 2006). Spatial mobility is yet another set of geographical relationalities that are enhanced by new highly portable and multifunctional information technologies; these dynamics only recently have begun to be analyzed; they have not yet been widely acknowledged in city-regional strategic planning initiatives. Diverse temporal boundaries also may characterize our relational constructions; temporal relationalities, for example, may inform strategic planning by establishing current development benchmarks that can be projected and forecasted; in turn, these can be used to stimulate the design of desired planned scenarios for future development short, medium and long term. Additionally, there are actor and structure relationalities that are critical in understanding and planning. These include individuals, institutions and organizations that influence and impede development; these agents and structures are the principal formal and informal actors and roles of society who must be engaged to take up the tasks of planning and strategy implementation. Analogous to music, and even more particular to jazz, the practice of relational planning requires the discipline that can come from theory and the creative improvisation that can come from practice, practice, and more practice—especially in a collaborative, interdependent team context. Further application and use of such theories and concepts will serve to advance the effectiveness of the practice of relational planning at regional and local levels, such that it becomes increasingly integral to, and engages the dynamics and complexities of, the global knowledge economy and network society.

Empirical assessment of relational planning efforts has demonstrated that strong inertial forces, such as embedded regulatory rigidities, can work unconsciously to thwart change in the practice of new-economy planning and in organizations and institutions that are stakeholders in, and influence the regional systems of planning (i.e., statutory and institutional environments). These observations are reinforced by path dependence and legacy practice approaches from the past. Critical, therefore, for the planners and development stakeholders of the city-region, is the need to create and sustain a culture of institutional consciousness. What are the ideal characteristics of such a culture? The members of such a culture would be sensitive to change and actively practicing relational thinking and behavior. Thereby, they would be engaging in mind-set change. The need to change the planning mind-set needs to be explicit and continuously reinforced in everyday planning practice. This will not occur quickly;
it will take sustained practice and experience to
gestate and imprint on the clients’ and the planner’s
approach to planned development.

Ultimately, however, the key elements of the
practice of relational planning most likely will
require the mandate of law and formal statutory
regulation, for example, especially the coordi-
nation or integration of telecommunications
infrastructure and physical infrastructure as
part of the official or legal brief of the region’s
public planning agencies. Such actions would
be intended to normalize and routinize the
practice and implementation of new relational
planning, and accommodate to new technologi-
cal infrastructural changes. To be responsive to
the dynamics of the global knowledge economy
and the network society, new organizational and
behavioral environments for planning need to
function in flexible and agile ways. For example,
it is important for practicing relational planners
to identify and act on legacy barriers to innova-
tion, and to be proactive and responsive to the
constantly changing environments external and
internal to the planning region.

Central to framing these new planning practice
pathways are three concepts of development: (1)
development; (2) digital development; and (3)
intelligent development. The working definition
of development, while driven importantly by
economic production functions, also encompasses
relationships across a range of social, cultural and
quality of life factors. Everett Rogers has provided
such an operational definition:

A widely participatory process of social change
in a society intended to bring about both social
and material advancement (including greater
equality, freedom, and other valued qualities) for
the majority of the people through their gaining
greater control over their environment (Rogers,

Digital development is the necessary ICT infra-
structure of a city and its region that is required to
plan and execute intelligent development. As con-
ceived here, digital development is a means to an
end. While development leadership of city-regions
should be working to extend ICT infrastructure,
such as broadband and ensuring the widest feasible
access to such development opportunity, strategic
planning should be under way that prepares the
locality for the time when near ubiquity of digital
infrastructure is in place. This means that there is
an immediate and sustained need to be innovative
in creating content that utilizes ICTs to increase
productivity of existing firms and industries and
to develop new economic development and jobs.
This is intelligent development.

In the context of the global knowledge economy
and network society, intelligent development,
therefore, is the ultimate state of development
for the practicing planner and her/his client
stakeholders to seek by means of strategic plan-
ing. On the foundation of digital development
infrastructure, intelligent development draws on
and is informed by theory, for example, location
theory and relational theory, in the formulation
of policies and in leading planning processes
with representative stakeholders to realize the
development potential of the locality’s unique
assets and resources. Development is intelligent,
therefore, when the most congruent theory and
the most applicable benchmarking elsewhere, and
the productive utilization of the latest technologies
and best practices are realized fully to develop
a community holistically, multidimensionality,
and equitably (Corey & Wilson, 2006, p. 206).
As digital development matures and becomes
more pervasive and integral to the routine and
everyday behavior of the economy and society,
city-region strategic planning priorities need to
shift more toward creative content applications
(i.e., intelligent development). In addition to
working toward the filling in and fulfillment of
equitable digital development access, practicing
planners need to be planning for future states of
ubiquity of ICTs.
The ALERT model is rooted in contemporary conceptualizing of development planning, drawing on the literature on relational theory and planning practice (Graham & Healey, 1999). The ALERT conceptual framework can stimulate discussion and understanding of local digital development and intelligent development. One of the major generic challenges to the practice of knowledge-based urban and regional development planning should result in the realization that a new mind-set for local planning is needed. Theory-informed and evidence-based actions then may be outlined for developing the needed new planning mind-set for engaging successfully in knowledge-based urban and regional development.

Context

In order to ground the ALERT model in the diverse cultures that characterize the advanced regions of the global knowledge economy, selected city-regions cases can be overviewed. These advanced global technology-economic regions include: North America; Eastern Asia; and Western Europe (see Albrechts et al., Spring 2003; & Healey, 2007). Such selected relational-planning case studies from these technology-economies exemplify some of the roles, actors, agents, and unique organizational and development dynamics that need to be assessed, aligned, and mobilized by regional and local stakeholders so as to be able to produce development strategies that are effective in today’s and tomorrow’s knowledge-based economy and society (Corey & Wilson, 2006, pp. 69-95).

The degree to which the dynamics and change stimulated by the network society has been argued and debated within academic circles, and between the academic and practitioner planning communities (Albrechts & Mandelbaum, 2005). As this discussion continues, we argue here that planning practitioners and their scholarly counterparts in planning schools should be acting in concert to expand our collective planned options under the new and complex environments of the global knowledge economy and network society. This can be achieved by means of translational research, wherein scholars and practitioners work together to advance and learn from planning practice.

To this point, the chapter has introduced some of the critical reasons for the planning profession and the practice of planning to be transformed. The current era and context of globalization requires change. Relational planning is a conceptual framework that accommodates to the new relationalities of globalization, information technologies, and knowledge-based development, and can be used to plan and realize intelligent development. The discussion turns next to how these needed transformations may be planned and implemented.

THE ALERT MODEL

The goal of this part of the chapter is to elaborate on the ALERT model, and to encourage planning practitioners to take effective planned intelligent-development actions. From awareness, stakeholders can identify and work with others who share similar development goals, and create their own place-specific planning-practice processes for producing knowledge-based urban and regional development as suggested by the application of the ALERT model. The following five planning elements and stages of the model comprise the principal sections of part two of the chapter.

Awareness

This is the evidence-supported foundation of knowledge-based urban and regional development. The awareness stage of the model serves as an opportunity and reminder that in order to plan effective strategies, planners need to compile and update continuously the relevant data and knowledge of particular cities and regions. It is the essential feedback function for the planning
The ALERT Model

system. The goal of the “A” phase of the ALERT model is to learn about a city-region’s unique development assets, and in the process, for the community’s stakeholder representatives and their planners to be motivated sufficiently to commit to a sustained process of fundamental long-term planned-behavioral change. By comparing these local facts and economic profile to successful, best-practice peer city-regions elsewhere, the strengths and challenges of the local economy can be revealed. These findings then may be used to inform development planning for the future. The result of this element of the model is to attain a state of heightened knowledge and evidence-informed concern sufficient to inform planning action among the city-region’s opinion setters and support actors, and to ensure continuous effort and outcomes to enhance the area’s competitiveness nationally and globally.

To be successful the awareness stage of the ALERT model must be sustained and continuous. The constant competition inherent in the global knowledge economy requires persistent monitoring, strategizing and assessments internally and externally (Corey & Wilson, 2006, p. 112-114; 228-229). Awareness of a city-region’s needs and opportunities is revealed in degrees of understanding. Consequently, it is critical that Awareness be operationalized continuously. This label is intended to convey the need that developing an effective “actionable knowledge” level of awareness requires systematic in-depth analyses and interpretation of the data and the selected empirical evidence required to engage effectively in informed planning and implementation.

Layers

The purpose of the “L” phase of the ALERT model is to understand a city-region’s position, especially in the context of the global economy and its national economy. This includes identifying principal competitor city-regions. An understanding of layers should produce a deeper understanding of the many and different geographical and temporal relations, and processes that are required to establish and track a city-region’s major technology and economic functional relationships, and thereby, be enabled to engage in successful relational planning.

Electronic Business or E-Business

In the “E” stage of the ALERT model, a more complete knowledge of the economy of a city-region may be developed by analyzing the present state of a locality’s business assets and resources, and by projecting and then constructing future visions and intended states of planned business goals. “Business” is conceived here as the monetary and non-monetary exchange of ideas, products, services, information, and capital; these transactions in this context include both electronically-facilitated and non-electronic exchanges. The task of sorting and understanding these relationships can be manageable by focusing systematically on each of the principal economic content sectors of electronically enabled business activities, including production, consumption, and amenities, and quality of life factors of the e-business spectrum, as shown in Table 1. The cells of the Spectrum may be linked and made interdependent by means of networked information technologies.

The Spectrum is labeled “E-Business.” Thereby, the intent is to convey the concept that diverse transactions by business, government, institutions and individuals increasingly are enabled electronically. The Spectrum can be utilized as a typology for identifying, analyzing and planning policy and for the development of the locality’s unique assets.

In Table 2 “Michigan Policies,” the format is used to identify policies and assets in the U.S. state of Michigan. A blank template of the table may be used by local planning actors to work through the planning processes of developing strategies for realizing the potential of knowledge economy opportunities for specific places.
within the city-region and to project and to plan for intended futures.

E-business as used here is relational, that is, it is a mix, and more frequently, a nonlinear blend of traditional face-to-face business that also may be electronically facilitated. The E-business spectrum activities, in locational terms are analogous to the “layers” component of the ALERT model, that is, these economic functions have different geographies that reflect generic spatial-organizational patterns of concentration and clustering, and deconcentration and dispersion. For example, tacit knowledge-based production functions in the upper left-hand cells of the spectrum often require such knowledge workers to be in close proximity to one another; therefore, clustering tendencies may be identified. Alternatively, economic functions that operate on codified information exhibit more spatially distributed locational patterns.

Various development gaps and disparities can be identified in this phase of executing the ALERT model, which may be used to produce an opera-

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**Table 1. The e-business spectrum: ICT driven economic development**

<table>
<thead>
<tr>
<th>Production Functions</th>
<th>Consumption (e-commerce) Functions</th>
<th>Amenity and Quality of Life Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercialization of Products &amp; Services (C)</td>
<td>Online Retailing: B2C &amp; G2C (D)</td>
<td>Natural Environmental Attributes (C)</td>
</tr>
<tr>
<td>Business &amp; Producer Services (C) &amp; Manufactured Products (D)</td>
<td>Value-Added Complementarities between Electronic (clicks) &amp; Physical (bricks) Channels (C&amp;D) F2F and E2E interdependencies</td>
<td>High Quality Education &amp; Human Capital Capacity Building and Talent Development (C&amp;D)</td>
</tr>
<tr>
<td>Public &amp; Government Producer Services (C&amp;D), e.g., regulations, taxes, information, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The functions and factors that are characterized by clustering and spatial concentration are identified with a “C.” Those that are characterized by dispersion and spatial deconcentration are identified with a “D.”

**Table 2. The e-business spectrum: Michigan case study**

<table>
<thead>
<tr>
<th>Production Functions</th>
<th>Consumption (e-commerce) Functions</th>
<th>Amenity and Quality of Life Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science &amp; Technology-driven Research &amp; Development (C) - $2 billion Jobs Tomorrow bond proposal</td>
<td>Online Procurement: B2B &amp; G2B/G2G alliances (D) - Michigan Deal – bulk purchases</td>
<td>Social, Cultural, and Institutional Activities (C &amp; D) – Cool Cities Initiative</td>
</tr>
<tr>
<td>Commercialization of Products &amp; Services (C) - Technology Tri-Corridor</td>
<td>Online Retailing: B2C &amp; G2C (D) – permitting processes</td>
<td>Natural Environmental Attributes (C) – Clean Michigan bond initiative</td>
</tr>
<tr>
<td>Business &amp; Producer Services (C) &amp; Manufactured Products (D), Government Producer Services (C&amp;D) (e.g., regulations, taxes, information, etc.) – SmartZones &amp; MBDA</td>
<td>Value-Added Complementarities between Electronic and Physical Channels (C &amp; D) (e.g., license plate registration renewal)</td>
<td>Quality Education, Human Capital Capacity Building and Talent Development (C &amp; D) – Jobs Today Initiative</td>
</tr>
</tbody>
</table>

The functions and factors that are characterized by clustering and spatial concentration are identified with a “C.” Those that are characterized by dispersion and spatial deconcentration are identified with a “D.”
The ALERT Model

The e-business component of the ALERT model makes two essential contributions: (1) it provides a conceptual framework for organizing this broad swath of economic functions, that is, production, consumption, and amenities and quality of life factors; and (2) it includes generalizations about the locational patterns, or the different geographies for each of the generic economic functions among the nine e-business spectrum cells. The E-Business Spectrum was constructed, therefore, to capture the current state in the evolution of electronically facilitated and traditional transactions of some of the economic functions for particular city-regions. Further, the organization of a city-region’s unique principal assets and resources in the contemporary knowledge economy can serve as the baseline for informing strategic planning for future states of development.

Responsiveness

During this, the “R” stage of the ALERT model, knowledge needs to be generated on the degree to which market forces and government initiatives meet and respond to the development demand, needs and goals identified in the E-Business component of the ALERT model. Such knowledge then may be used to invest strategically in the revealed opportunities, inequalities, and spatial disparities to produce a more productive and equitable spatial distribution of access to the opportunities,
for example, access to high-speed broadband, offered by the city-region’s technology-facilitated communication and information-sharing, and access to harnessing the development potentials of globalization dynamics (Corey & Wilson, 2006, pp. 128-131; 231-233).

In order to gauge the level of responsiveness of the current practice of planning to a city-region’s development within the context of the global knowledge economy and network society, it can be helpful to examine the planning products and self-reported planning behaviors, and attitudes of an area’s planners and other local development stakeholders. Such an assessment can inform planners of the need for “mind-set change” in the local planning culture in order to move toward planning for the new realities of the globalizing economy.

Over the last six years, several graduate students in the Urban and Regional Planning Program at Michigan State University have conducted empirical research on the practice of regional and local planning across the state of Michigan in the United States. From surveys of practicing planners and from assessments of their economic development Web sites, conclusions were drawn regarding their e-readiness and the degree to which their routine planning practice incorporated ICTs and digital development as a significant element of their professional behavior (Corey & Wilson, 2006, pp. 115-117). These findings were mapped by county and by the spatially more encompassing planning region. Refer to Figure 1 “2003 Responsiveness and 2005 Responsiveness” (Frederick, 2006, pp. 85-86). Because these studies were conducted over time, it has been possible to observe some change and progress. Five and six years ago, it was only the state’s most urbanized regions that incorporated digital development in their planning (Corey & Wilson, 2006, p. 118). Now, the practicing planners throughout Michigan demonstrate that: (1) earlier lagging areas are attending to and incorporating digital development in their planning strategies and development; (2) earlier responsive regions, over time, had built their initial investment in digital development, and they were focused increasingly on the economic development content as captured in the e-business spectrum; and (3) several regions of the state remain in relatively laggard or non-responsive conditions in terms of planning for digital and intelligent development. Routine and explicit monitoring, and evaluating regional and local development-planning responsiveness is critical in the fast-paced change environment of the global knowledge economy and network society. Too often, planners, policymakers, and researchers do not attend to and advocate for the issues of strategic responsiveness; an example exception, at the national-economy level, is Tzong–Shian Yu in the case of Taiwan’s possible responses (Yu, 2004, p. 35-44).

Talk

The “T” stage of the ALERT model includes discourse and inter-sectoral communication, but the word “Talk” is used here also to convey and symbolize much more than speech and discussion among a city-region’s diversity of development actors. Talk, in the context of the ALERT model, is merely the beginning of a continuous sustained process of engagement and collaborative behaviors among the principal representative stakeholder individuals, institutions and organizations of the city-region. This is a new-governance organizational approach that is needed to ensure that the city-region has the planning impetus and mind-set necessary to compete in the new context of the global knowledge economy and network society. Among the range of content and process priorities that must be addressed are: (1) governance; (2) human capital development; (3) enterprise culture development; (4) equity; and (5) the deepening, diffusion, and perfection of the new knowledge-based development planning mind-set. These activities are essential best practices for effective regional and local scale
planning in the context of the global knowledge economy and network society.

1. **Governance.** If government at the scale of the city-region is working effectively and its strategic development planning is enabling the region to be competitive and successful in the context of the global knowledge economy, then government is functioning as a lead member of the region’s development team of stakeholders. However, more typically, because of path dependence, and the normal lag in mind-set change from old-economy thinking to new-economy development planning, it may be expected that new regional governance structures and processes will have to be devised, mobilized, and experimented. What are some of the issues that must be confronted when considering the invention of governance approaches to empower the stakeholders of city-regions to plan for development in today’s and tomorrow’s continuously changing knowledge-based environment? New knowledge economy governance structures for a city-region need to reflect the principal multiple-sector stakeholder representativeness of businesses, governments, institutions, and individuals. By developing alliances and partnerships, in time, such structures can function as informed “squeaky wheels” that can demand and receive response and attention from the market place, the formally mandated government agencies, non-governmental organizations, and multiple levels of governments of a city-region. To be effective in the technologically linked global environment, invented governance activities for the complexities of digital development and intelligent development need to result in choice among investment alternatives and consensus on strategic priorities for future-development planning.

Creating and perfecting effective governance behavior is fraught with challenge. However, with sustained and tenacious commitment, intentional change can be realized.

2. **Human capital development.** The development of human capital throughout the human life span (i.e., from early childhood development through to the formal primary, secondary and tertiary education and in-service job development education and training) is the principal investment for a city-region’s effective development in the context of the knowledge-based era. Resulting talent is the fundamental resource for future intelligent development. These educated human resources, to be competitive, also must be innovative and creative. Both theoretically and empirically, the case has been made for the need to develop human capital and an enterprise culture for city-regions to be successful and competitive in the global knowledge economy and network society (Plummer & Taylor, 2001a; 2001b; 2003). Effective tactics for retaining knowledge workers is one of academe’s and the policy community’s larger challenges. For insightful discussion of these issues, refer to Clarke and Gaile (1998, pp. 105; 181-194).

3. **Enterprise culture development.** To be competitive, it is critical to create a sustained enterprise culture throughout the city-region. This culture needs to host and support entrepreneurship and innovation by means of cross-sectoral collaboration and partnerships among the business, governments and nonprofit institutional communities. With human capital development and enterprise culture development taken together, the literature repeatedly underscores three characteristics. One is youthful dynamism and entrepreneurial risk taking. They are the source of energy, new starts, productivity in the workplace, and high savings that are
transformed into complementary physical capital. A second is the level of skill and how rapidly the composition of skills can be varied in response to market demands. A third is creativity, which is associated with skills and level of education, but whereas skills are correlated with productivity and efficiency, creativity is linked to innovation (Yusuf & Nabeshima, 2006, p. 81).

4. **Equity.** Thomas Friedman has observed that the global economy is “flattening” (Friedman, 2006). Because of the growing pervasiveness of ICTs and digital development, he has led us to conclude that workers in, say Tianjin (China), Tallinn (Estonia), and Texas are competing economically on a field that increasingly is being leveled by means of ICTs and their global networking capacities. At the same time, it is clear that a level playing field, in fact, has not been realized fully, either within economies or across economies. Consequently, in order to raise the overall level of economic productivity and competition for a city-region, planners and their stakeholders should place a high priority for investment in equity development. Explicit and active planning attention to the city-region’s economically distressed communities and individuals is required. This means identifying such disparities and developing strategies and plans to attain more just and equitable distribution for opportunities to engage the locality’s potentials for the global knowledge economy and network society. Psychologist Howard Gardner has offered detailed operational analysis and advice on the dynamics of and lessons for changing minds (Gardner, 2006). He has identified the crucial dimensions for changing minds, and used these lessons to offer, for the use of planners and others, a checklist for engaging in mind-set change and to take into account: (a) current or present content and desired content; (b) size of audience; (c) type of audience; (d) directness of change; (e) levers of change and tipping points; and (f) an ethical dimension (Gardner, 2006, pp. 209-212). Gardner’s crucial dimensions were derived from his three sets of factors for mind changing:

Seven levers of mind change are—reason; research; resonance; re-descriptions; resources and rewards; real world events; and resistances.

Six arenas or realms of mind change are—heterogeneous groups; homogeneous groups; by means of works of art, science & scholarship; changes within formal instructional settings; intimate forms of mind changing involving two people or a small number, such as family members; & changes within one’s own mind.

Four contents of the mind and entities of mind change are—concepts; stories; theories and skills or practices.
These levers, arenas, and contents may be selected and aligned to design programs and interventions intended to initiate and sustain mind-set change. With practice and tenacity, planners and their client stakeholders can change our minds, and the minds of others. Subsequent planning practice behavior can be influenced so that their visions, strategies, and intentions recognize the centrality and criticality of knowledge-based intelligent development that is tailored to capitalize on the particularities of the global knowledge economy and network society, and their relations with specific regions and localities.

The synoptic result of the “Talk” element of the ALERT model should not be so much a plan, more importantly it should be a commitment to practice planning in an on-going process of actively engaging the complexities and opportunities of the global knowledge economy and the resulting development planning potentials. The ultimate outcome is that this Talk process, to be effective, must be sufficiently responsive and dynamic to empower a city-region’s stakeholders to compete effectively amid the complex constantly changing forces and flows that drive the global economy and network society (Corey & Wilson, 2006, pp. 131-133; 233-234). After the initial Talk activities, there needs to be an ongoing “Beyond Talk” phase that is a continuing process of auditing and transparency, including monitoring, evaluating, surveying, and updating the development planning by means of planning future intelligent development scenarios, priority setting, and plan implementation (Corey & Wilson, 2006, pp. 134-138).

CONCLUSION

The global economy has been, and is, in transition from the old economy to the new knowledge-based economy. Routine planning practice needs to catch up with the new economic realities and master its complexities as they impact local, sub-national communities (Healey, 2007). It is noted, therefore, that the ALERT model and the narrative used here to illustrate the various components of the model are a relational conceptual framework that also is in transition. Ultimately, urban and regional planning practice in the global knowledge economy and network society is more likely to be effective in a fully relational mode, that is, both as a result of planner behavior and as a result of the regulatory and development environment within which planning is, and should be practiced.

Planning scholars, Dowell Myers and Tridib Banerjee have written:

we must reconcile the chasm between academia and the profession by working together. First, we must recognize the division of labor among key sectors in planning: the academic field, the profession, and the practice. Academics can explore problem areas not yet codified into professional practice, and they can bolster the reputation and standing of the profession through their publications and interactions with other academic fields. ... The profession must have a forward-looking position that anticipates this rapidly evolving future, prepares itself for future opportunities and challenges, and remains intellectually nimble enough to adapt to new professional and pedagogic challenges (Myers & Banerjee, Spring 2005, p. 128).

In addition to the need for planning practitioners to engage such new and relational approaches, it is believed that planning theory also can benefit by having planning theorists actively take up the many challenges of advancing relational approaches as part of the general body of evolving planning theory. This task might be accomplished most effectively by planning theorists and planning practitioners closely working together, and with the common goal of taking the
profession more centrally into the local development of a country’s regions and communities. In this context, translational research should be an explicit shared value of the planning practitioner and the academic-based planning practitioner-scholar alike. Translational research is driven by an explicit objective of advancing and learning from relational planning practice. Borrowing this concept from current clinical and basic medical research and practice, there is a need for more academic practitioner-planners to focus their scholarly effort on the intersection of theoretical and basic urban and regional planning research, and empirical exploratory planning research and planning practice.

In the end, collectively we can draw continuous inspiration from several sources: the late Kurt Lewin and the ancient Chinese philosopher Lao Tse. The eminent social psychologist Kurt Lewin expressed his views that we can do better if we seek to minimize the costs, inefficiencies, and limitations of trial and error only methods. This may be accomplished by means of close cooperation between theoreticians and applied action takers and practicing planners. Lewin wrote:

If the theorist does not look toward applied problems with highbrow aversion or with a fear of social problems … there is nothing so practical as a good theory (Lewin, 1951, p. 169).

In the case of the knowledge-based ALERT model, this chapter has sought to introduce a practical conceptual framework and related working approaches for empowering regional and local planners, and their stakeholders to invent, plan, and practice effective strategies for their communities to compete within the context of the global knowledge economy and network society.

The philosophical imperative of this chapter has been to offer theory-informed and empirically-derived context and framing for the consideration and use of practicing development planners and their constituents. However, intentionally we have avoided “solutions and recipes.” There are no generic answers. Given the unique assets and resources of each city-region, the only option for local planners and their client stakeholders is to invent their own particular and distinctive approaches for relating their respective communities to the challenges and opportunities of the global knowledge economy and network society. The lesson to be practiced is to adhere to Lao Tse’s famous proverb—as extended.

If you give a man a fish, you will feed him
once.
If you take a man fishing, you will feed him
for a week.
If you teach a man to fish, he will never be
hungry.

Wilson and Corey here and in their recent
book (2006) have extended this philosophy by
stating:

If you teach yourself how and where to fish
successfully, then you are empowered, and with
practice, you can empower others.

This chapter can only touch on the complexities of operationalizing intelligent planning. This book offers deeper and wider coverage of the issues involved in practicing local planning in the global knowledge economy and network society. The book strives to provide the pathways and directions necessary to enable planners and their client stakeholders to initiate and tailor knowledge-based planning processes that are likely to be more effective and successful than the kind of old-economy planning that dominates much of planning practice today. For example, the book discusses the macro-scaled empirical contexts that vary across the advanced regions of the globe’s technology- and knowledge-based economy; these include Eastern Asia, Western Europe, and North America. The book also includes such planning-support systems as re-
The ALERT Model

olution planning scenario cases from each of these major technology-economic regions, and extensive definitions of the various syntheses of new theories, concepts, terms, and techniques that pervade knowledge-based development and planning discourse. These supports and operational action frameworks are pragmatic. They are designed to stimulate motivated planners and the institutions that they can influence to self-teach, practice systematic experimental trial and error learning and, thereby, to perfect new-planning mind-sets and relational behavior by means of explicit high-priority emphases on creativity, innovation, and collaboration.

FUTURE RESEARCH DIRECTIONS

It is recommended that future research on the topics and issues addressed in this chapter be couched within the strategic context of translational research. As noted above, this research approach is intended to advance the collaboration of the practitioner and the researcher in mutually beneficial ways.

Borrowing this concept from current clinical and basic medical research and practice, there is a need for more academic practitioner-planners to focus their scholarly effort on the intersection of theoretical and basic city-region planning research and empirical exploratory planning research and planning practice. Bi-directional feedback and exchange should be the rule at this interface. It is by means of reciprocal, reflexive interaction that the planning profession might more readily incorporate and internalize relational understanding and relational planning behavior, resulting in the realization of new relational mindsets and relational approaches by all planning practitioners (Corey & Wilson, 2006, p. 219).

Such research partnerships between planning practitioners and planning researchers need to focus and advance the state of the art of relational planning theory development and relational planning practice. The theory-development part of this research agenda might take its initial inspiration from Bish Sanyal’s call to the profession to “construct theories to meet the needs of planning practitioners” (Sanyal, 2000, pp. 322-326). The practice-development part of a translational research agenda might be stimulated by the bodies of work that have been developed by Patsy Healey and Louis Albrechts. Both of these researchers have delved deeply into relational planning practice and theory in the context of governance, spatial strategies, and network society, among some of the other relational themes as noted above in this chapter (Healey, 2007; Albrechts & Mandelbaum, 2005).

Empirically, there is a great need further to assess the impact of digital development or ICTs on the full range of functions and linkages of cities and regions. It is important to build up a stock of analyses and evaluations that reveal how urban and rural areas are developing in this era of the information society and knowledge-based development. The E-Business Spectrum introduced above might be used as an initial taxonomy to stimulate and organize such empirical research into the sectoral, spatial, temporal, and networked development. As digital development becomes more ubiquitous, and thereby accessible to more individuals and organizations, such empirical assessments should pay particular attention to issues of content and intelligent development. In the end, it is the use and application of digital technologies that are instrumental in producing new opportunities for future development and progress. Such intelligent development content foci should include the assessment of: human capital development; enterprise culture development; mind-set change; governance results; and equity development and advances in social justice.
Additional empirical research should focus on organizations and organizational behavior among the agents and actors in their respective roles throughout city-regions. Unless there is effective and responsive organization of the strategic planning mission and its many operational tasks, there will be less than fully successful planned results. For example, some researchers have probed into professional planners, and their perceptions and practices in digital development and intelligent development (Frederick, 2006). Additional local actors and their development roles should be researched similarly; these might include: business persons and their firms, especially small and medium-sized businesses; and economic developers and their need to go beyond traditional real estate development, and also to take up the advancement of knowledge-based urban development activities, such as involving the commercialization of intellectual property from science and technology research, and development functions.

So as to advance intelligent development of the city-region, another evolving sphere of socio-technical relational development that should be researched is the increasingly overlapping and interdependent worlds of the material and the virtual. Social networking is the space where cyber space and physical space come together. These approaches might be used to enhance and broaden participation, social capital development, and communication in planning with the non-organized public of city-regions. Further, inter-generational involvement should be sought and realized by using these electronic communication tools to engage young individuals of the community. The generation of youngsters who are familiar and facile with the following tools will enrich the planning of intelligent development strategies. These results need to be researched, and their impact and added value assessed; such social networking and communication tools to be used in planning may include: instant messaging; Internet forums; online chat technologies; wikis; blogs; computer games; and virtual life technologies, such as Second Life (i.e., a three-dimensional virtual world constructed by its real-world residents) (Second Life, n.d.).

Finally, planning schools in universities around the globe should consider having their faculty and students engaged in, and experimenting with these and other research and learning issues. Conducted in collaboration with professional and citizen planning practitioners, and in the spirit of innovative translational research, such future research can be expected to advance the state of the art and science of contemporary digital and intelligent planning practice, and relational theory advancement.

REFERENCES


The ALERT Model


### ADDITIONAL READING


Journal of Urban Technology is published three times per year. It is a useful forum for staying abreast of contemporary developments in technology facilitated innovations in cities and regions.


Chapter VI
From University Town to Knowledge City: Strategies and Regulatory Hurdles in Germany

Peter Franz
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ABSTRACT

The trend of cities, serving as a location for universities and research institutes, to take into consideration new strategies utilizing this location factor for growth-oriented urban development also can be observed in Germany. An overview of the quantitative preconditions shows that many German cities dispose of favorable preconditions for such a knowledge city strategy. An analysis of the policy arena comes to the result that the political actors are confronted with the task of a complex multi-level-policy where networking skills become essential. A comparison with the policy conditions in the U.S. makes it quite clear that especially the German universities have the status of semi-autonomous actors complicating negotiating and coordinating activities between city and science representatives. First examples of deregulation show that these hurdles can be overcome in the future.

INTRODUCTION

Since the year 2005 a German foundation has started to invite the German cities to compete every year for the title “City of Science.” The introduction of this kind of competition shows that important actors of the German economy have discovered that local government and politicians could and should do more in knowledge transfer between science and firms, and in making cities with scientific institutions more attractive places to work and to live in.

In November 2006, representatives of 49 European cities have met in Magdeburg (Sax-
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ony-Anhalt) at the “First European Congress of Science Cities.” During the congress a “Declaration of Magdeburg” was formulated, in which the participants “… recognize that science, creative and knowledge based industries are driving forces of sustainable economic growth, along with employment and urban development to realize the Lisbon Strategy on a local level” (see www.sciencocities.eu/fileadmin/dokumente/Declaration_of_Magdeburg.pdf).

Activities like these show an increasing trend to take a fresh look at scientific institutions as universities and research institutes, and to perceive their potential for new ways in economic and urban development. One might think that in Germany with its long tradition of university education and its diversified landscape of universities and research institutes, advocates of this fresh perspective would preach to the converted. In a global context, Germany belongs to those countries whose cities developed a university culture from the early Middle Ages. Even today, the centers of some cities with their medieval buildings and places serving as university location resemble the classic “university town”: a little bit sleepy and with a public sphere coined by the rites and habits of the academic (sub-)culture. Later on the innovation of the Humboldt-type university in the 19th century was unique and served as a blueprint for the newly evolving universities in North America.

One might suppose that these bygone developments should be a favorable precondition for becoming a pioneer in the modern trend in creating knowledge or science cities—whatever that means. The following sections in this chapter will show why the German cities, up to now, face difficulties to re-orientate themselves for the demands of a coming knowledge-based economy and do not have a pioneering function in the trend toward the knowledge city. So the chapter’s focus will be on institutional regulations. It is organized in the way that the following section will shed some light on the role of scientific institutions in a knowledge-based economy. Thereafter, some basic constituents of knowledge-city strategies for the German case are specified, including the spatial distribution of universities and research institutes across the German cities, and the relevant policy measures and goals. The two sections to follow inform about several regulations and institutional specialties in Germany effecting as obstacles for choosing and implementing a knowledge-city strategy. In the two final sections, the author will draw some conclusions, discuss some implications of a rising knowledge society, and will outline future research directions.

The methods applied in this chapter comprise the secondary analysis of diverse statistical data (Table 1), the analysis of documents that were elaborated by certain cities taking part in a competition (Table 3), an international comparison between regulations concerning universities in the US and in Germany, and a systematic screening of policy instruments suitable for knowledge-city strategies (Table 2).

BACKGROUND: THE ROLE OF SCIENTIFIC INSTITUTIONS IN A KNOWLEDGE-BASED ECONOMY

At present, the concept knowledge-based economy is wide-spread and very popular. Since the principal decision of the commission of the EU 2000 in Lisbon to reshape the EU “to the most competitive and most dynamic knowledge-driven economy by 2010” (Lisbon European Council, 2000), even ahead of the U.S. and Japan, the striving for a knowledge-based economy has reached the status of an official target of a community of states.

Similar to other in-words (e.g. globalization), there is a risk that the usage of the concept knowledge-based economy will come to be a platitude as long as its content is not specified. For two reasons this risk is even larger concerning the concept of the knowledge society:
First, we cannot imagine the functioning of economies without the acquisition, application, distribution, and new production of knowledge. This requires a more precise statement about the new quality of using knowledge at present. The answer cannot be that today we use a higher quantity of knowledge, because we do not have an objective measure to decide if an industrial worker of the 19th century had more knowledge as a craftsman of the 16th century, or if a laptop contains more knowledge as a printing press, or a spearhead (Foray, 2004).

Second, we have difficulties to realize the changes strengthening the trend to a knowledge-based economy by means of our senses. This was not true for the transition from agricultural society to industrial society, but the transoceanic fiberglass cables we cannot grip with our hands. The Internet data banks available per Internet can no longer be localized, and the digitally transformed communication streams are noiseless and have no scent. Only the growing number of computers, screens, modems, and satellite dishes give evidence of something going on that is not so easily understood (Foray, 2004).

So what are the central features from which we can recognize that certain forms of knowledge and certain forms of handling knowledge are becoming more important in our society? A first feature consists of the intensification of information and communication flows becoming possible by means of the advances in IT technology. A second feature is the economy’s strong orientation to innovation, not only with respect to products, but also with respect to production processes and to the management of organizations. The demanding level of innovations strived for is for many firms only attainable: (a) by means of intensified (in-house) R&D, (b) by means of intensified R&D cooperation with other firms and with additional knowledge producers outside of the economy, especially universities and research institutes, or c) by means of patent or license acquisition. A third feature of the rising knowledge-based economy consists of institutionalizing high-quality learning and lifelong learning within the educational system. As a fourth indicator feature, we can take the growing importance of knowledge-based activities and sectors. It happened in 1992, for the first time the stock exchange value of Microsoft—a firm exclusively dependent on the factor knowledge—surmounted that of General Motors, one of the classic US industrial giants (Rosenberg, 1998).

We can take it as self-evident that in a knowledge society especially, those institutions gain importance whose primary purpose is the production of knowledge. In Europe, since the Middle Ages, the university was the place where researchers produced new knowledge and where this knowledge was disseminated to the younger generations. Beyond this function for producing new knowledge and human capital, there is a trend that certain characteristics of the academic working style seem to become more important for white collar and even blue collar workers. This applies for (1) a distinct curiosity, (2) an inclination to explore one special problem by ongoing new variants (trial and error), (3) an egalitarian style in communication with colleagues and a low acceptance of hierarchic relations, (4) an intrinsically motivated occupation with topics at the workplace, and (5) a readiness to cooperate with colleagues and specialists from other departments (Franz, 1999, p. 115). Perhaps this may become an additional feature of the knowledge society that certain treats of the academic working style spread to the professional world beyond the science sphere.

Concerning the main functions of the university, in Europe, and especially in Germany, the Humboldt model of the university intertwining research and teaching flourished at the end of the 19th and the beginning of the 20th century.
Basic inventions in physics and chemistry laid the foundations for industrial application, and in combination with this application, new technologies and professions developed. In Germany, the areas of applied research and the education of engineers took part in technical academies with a status below the university. In the US, this was quite different: The disciplines of applied research and engineering were quickly integrated in the university system (e.g., by founding faculties of engineering) and giving applied sciences, like statistics, full academic status (Rosenberg, 1998).

A new type of university came into existence, with the Massachusetts Institute for Technology (MIT) as the ideal representative linking, research, teaching, and innovation (Etzkowitz, 2002). Together with the increasing orientation to the demand of enterprises at the US universities cooperative training programs, industrialists in advisory boards and jointly sponsored research laboratories came into use. This re-orientation was supported by an enlargement of public and private funds for research and by the universities’ intensified competition for these funds.

At present, in the US, a trend prevails toward the entrepreneurial university. This means that the knowledge produced at the universities is checked more systematically for its usability for economic purposes and for its patentability. Since the Bayh-Dole Act of 1980, US universities have far-reaching rights in marketing and licensing patents of their scientists. Another feature of the entrepreneurial university is the strong support of startups and spin-offs and the teaching of entrepreneurial know-how.

In spite of this pronounced orientation of the US universities to demands of the private economy, regional economists have found out that only from the 1980s onward has the existence of a university had a significant positive effect for the income of the region where it is located (Goldstein & Renault, 2005). In comparison with other factors, this influence still is rather weak. So even in the US, the claim of a knowledge-based economy is more a projection for the future and less a reality already arrived.

It shall not be failed to mention that this development toward an entrepreneurial university also implies some problems, especially the risk of knowledge produced in universities losing its property as a public good. Another risk consists of possible restrictions in research caused by an excessive patenting policy. At the same time, the success of the US university model gives an imagination of the role German universities could play within a knowledge-based economy, if they would not be handicapped by a straight-jacket of regulations. In a recent memorandum, the European Commission has criticized, that the European universities have deficits in pushing ahead this development: “European universities are currently not in the position to achieve their potential in a number of important ways. As a result, they are behind in the increased international competition for talented academics and students, and miss out on fast-changing research agendas and on generating the critical mass, excellence, and flexibility necessary to succeed. These failures are compounded by a combination of excessive public control coupled with insufficient funding” (European Commission, 2006, p. 4; italics as cited). Before the most important regulations will be dealt with more carefully, the following section will concentrate on the preconditions and constituents for applying a knowledge city strategy for German cities.

**CONSTITUENTS OF KNOWLEDGE CITIES AND OF KNOWLEDGE CITY STRATEGIES**

A knowledge-based economy depends heavily on sources of new knowledge. Universities and research institutes typically produce knowledge in the form of a public good, accessible not only at its place of origin but, at best, all around the world. This will be achieved by means of printed
and electronic publications (i.e., codified knowledge). The location of the knowledge producers only gains significance as knowledge is conceived as a multi-dimensional concept, embracing more components beyond this codified dimension. With the assumptions, (a) that knowledge also has a tacit dimension, transferable only by face-to-face interaction, and (b) that the share of this second component gains importance especially in the process of knowledge production, the spatial proximity to the location of the knowledge producers becomes a crucial variable. It also can be deduced from these assumptions that the enterprises located in the same region can gain advantage from their spatial proximity to a scientific institution by means of: (a) easy access to the newest pieces of knowledge, (b) cooperative R&D endeavors, and (c) knowledge spillovers (e.g., in form of offering employment opportunities to parts of a university’s staff and/or graduates). The following reflections about strategies to create knowledge cities are the attempt to exploit the fact of spatial proximity for the purpose of urban economic and demographic development.

Taking these preliminary considerations seriously, only cities with knowledge-producing scientific institutions (universities, research institutes) will have a chance to evolve into a knowledge city. Table 1 shows how many of the 700 German cities with a population size above 20,000 correspond to this precondition. Contrary to the Anglo-American tradition, a vast majority of the German universities and of the larger research institutes are dependent on public funds. The proportions of students in Germany visiting privately financed universities are only 1%, respectively 10% in the case of universities of applied sciences (Brauns, 2003, p. 18). So the bias caused by the restriction to publicly financed scientific institutions in Table 1 can be tolerated, if the numbers are understood as a lower limit of relevant scientific institutions. The numbers demonstrate that scientific institutions tend to be concentrated in larger cities: 81.7% of the cities with more than 100,000 inhabitants, but only 9.0% of the cities with a population in the range of 20,000-50,000 dispose of at least one publicly financed scientific institution. The champion is Berlin with 39 scientific institutions, followed by Dresden with 21, and Munich with 19. Among the middle-sized larger cities (100,000-250,000 inhabitants), Potsdam (12, adjacent to Berlin), Freiburg (11), and Karlsruhe (10) in Baden-Württemberg, and Halle (10) in Saxony-Anhalt house a considerable number of scientific institutions.

In the case of some larger cities the look at cities instead of city regions in Table 1 conceals the constellation, that some research institutes

Table 1. Numbers and proportions of German cities (> 20,000) with publicly financed universities and research institutes\(^1\) according to population size

<table>
<thead>
<tr>
<th>City size category</th>
<th>Total number (2)</th>
<th>Among them cities with .... publicly financed universities and research institutes</th>
<th>Proportion of column (2)</th>
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<tbody>
<tr>
<td></td>
<td>Number of universities and research institutes</td>
<td></td>
<td>%</td>
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<tr>
<td></td>
<td>&gt; 20</td>
<td>10 - 20</td>
<td>5 - 9</td>
</tr>
<tr>
<td>&gt; 500,000</td>
<td>12</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>250,000 - 500,000</td>
<td>15</td>
<td>1</td>
<td>2</td>
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<tr>
<td>100,000 - 250,000</td>
<td>55</td>
<td>-</td>
<td>3</td>
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<tr>
<td>75,000 - 100,000</td>
<td>31</td>
<td>-</td>
<td>-</td>
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<tr>
<td>50,000 - 75,000</td>
<td>77</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20,000 - 50,000</td>
<td>510</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>700</td>
<td>2</td>
<td>10</td>
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</tbody>
</table>

\(^{1}\) Includes universities and research institutes.
may be located in smaller communities adjacent to the larger city: The former capital city, Bonn, has nine scientific institutions within its boundaries, but additionally five in direct vicinity. In cases like these, the importance of the city as a science location may be underestimated.

After this view on a necessary precondition for becoming a knowledge city, an answer must be given to the question: What could and should be the general goals of a knowledge city? With regard to the scientific institutions themselves, institutional growth would improve the prospects for an increasing production of knowledge—with respect to quantity and quality. Especially rising quality would lead to an increase in reputation and to a better standing in the competition for research funds subsequently. Concerning the cities, flourishing scientific institutions have in the short run the results of demographic and local economic (demand-led) growth, when a larger number of students and scientists can be attracted. In the long run, speeding-up local economic growth and an ameliorating city’s tax base will result from new firms locating within the city’s boundaries, as well as spin-offs from the scientific institutions as established firms from other regions.

Up to now, the goals mentioned seem to be attainable by isolated action of the scientific institutions and the city government. But usually, knowledge city strategies try to take advantage of additional synergetic effects linked with cooperative action, and thus involve basically networking activities. Cooperation between scientific institutions may help to start common research, to ease the transfer of (mostly tacit) knowledge, as well as—in an advanced state of cooperation—to sharpen the profiles of the involved universities and research institutes with the expectation to gain network effects of complementarity (Capello & Rietveld, 1998). In Germany, scientists of different universities and research institutes are used to cooperate in research, but their CEOs are less if a redistribution of public funds would be implied. Cooperation between scientific institutions and the city government could contribute to consider the needs of students and scientists as residents in planning processes, to ameliorate the knowledge transfer from science to firms in the region, and to support the local employment or entrepreneurial opportunities of the graduates (Table 2).

Frequently a city’s decision to practice a knowledge city strategy is linked to a re-alignment of its local economic development policy. The support of older industries and the preoccupation with attracting firms from outside the region is abandoned or becomes less important in favor of a policy of strengthening endogenous potentials of human capital, spin-offs, and technology-oriented firms (Table 2).

Beyond the local level, there are policies in Germany on the Länder level and the federal level influencing the conditions of scientific institutions and firms using knowledge of these institutions. The majority of these decisions concerning scientific institutions are met by the Bund Länder Commission for Educational Planning and Research Promotion4 (http://www.blk-bonn.de/englisch/contents.htm). A relatively recent instrument are competitions for centers of excellence at the Länder and at the Federal level. Within the frame of a “strengthen the strengths”-strategy, additional funds are granted to the winners: particular universities, intra-university research networks (Kultusministerium Sachsen-Anhalt, 2004) or inter-institutional research networks. The diverse policy arenas and policy measures/goals related to knowledge city strategies are listed in Table 2.

First experiences of scientific institutions taking part in competitions for centers of excellence show that it certainly is no easy task to define the potentials of excellent science within a local landscape of universities and research institutes. The task can be compared with the process of identifying the core competences of a firm (Hamel & Prahalad, 1994) in order to strengthen a firm’s competitiveness. In Berlin, the German city with the largest number of scientific institutions, con-
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Conflicts between the three large universities have prevented a joint strategy until recently (Brake, 2004; Matthiesen et al., 2004). Only after the setting-up of a commission (Wissenschaftskommission Berlin) the difficult task of defining the core competences of the science located at Berlin could be solved by means of an elaborated report (Wissenschaftskommission Berlin, 2007).

With the policy measures presented so far in mind one might ask, to what degree the German cities being winners in the competition “City of Science,” mentioned in the introductory section, refer to them. The overview in Table 3 shows that the winner cities concentrate on measures with event-character and with stress on the dissemination of scientific knowledge to special target groups. Many projects are intended to work for a fixed period, and it stays uncertain, if there will be lasting effects. Only the city of Dresden disposes of a network embracing members of the city government and of the heads of the scientific institutions. But, nevertheless, activities like the ones listed in Table 3 can be the starting point for more intensive cooperation in the future.

Another question with regard to the measures listed in Table 2 might be, if a sufficient stock of approved scientific knowledge for a successful application of these policies exists. But this task

<table>
<thead>
<tr>
<th>Policy arena / Responsibility</th>
<th>Policy measures</th>
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<tbody>
<tr>
<td><strong>Government at the Federal and the Länder level</strong></td>
<td></td>
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<tr>
<td>Science policy</td>
<td>Decisions about locations, profiles, expansion, and closure of scientific institutions</td>
</tr>
<tr>
<td>Technology and Innovation policy</td>
<td>Inviting universities to compete for special funds destined to “centers of excellence” (since 2005 at the Länder level and since 2006 at the Federal level)</td>
</tr>
<tr>
<td><strong>Local (City) government</strong></td>
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<tr>
<td>City planning</td>
<td>Incentive measures for networking between scientific institutions and firms, and application/development of new technologies</td>
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<tr>
<td>Planning and building facilities (e.g., technology parks), which help to intensify the knowledge spillovers between scientific institutions and firms</td>
<td></td>
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<tr>
<td>Urban economic development</td>
<td>Rise the city’s attractiveness for students, scientists, teaching staff by, for example, student housing, facilities for recreational activities, revitalisation of the city centre</td>
</tr>
<tr>
<td>Rise the city’s capacity and efficiency of the city’s infrastructural endowment</td>
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<tr>
<td>Attract new firms and scientific institutions</td>
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<tr>
<td>Support network building and bilateral cooperation between firms and scientific institutions</td>
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<tr>
<td>Support local employment opportunities of graduates</td>
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<tr>
<td>Support spin-offs and other forms of entrepreneurship of university staff</td>
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<tr>
<td><strong>Local science policy by heads of scientific institutions</strong></td>
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<tr>
<td>Profiling and re-aligning the own institution</td>
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<tr>
<td>Lobby local government for interests of academia</td>
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<tr>
<td>Initiate network building and bilateral cooperation between scientific institutions</td>
<td></td>
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<tr>
<td>Support spin-offs</td>
<td></td>
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<tr>
<td>Support cooperation with firms</td>
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of discussing relevant theories in detail would go beyond the scope of this chapter (for some theories of regional economics see Glaeser & Saiz, 2003; Franz, 2004) and would distract from its focus on institutional conditions.

With the application of a strategy combining different policy levels, also the question of leadership arises. Who should care about the knowledge city strategy? The experience shows that it is indispensable that the local level—the mayors of the cities, perhaps in combination with a special task force—has to play a leading role. The initiating impulse may come from outside, for example, in the form of a competition, but progress will strongly depend on the networking skills of the city government. Ironically, the actors at this policy level dispose of the least means and power to make headway with a knowledge city strategy. In the following section 4, certain problems in connection with these different policy levels and differing power resources will be discussed.

REGULATIONS IN GERMANY SLOW DOWN THE TREND TO A KNOWLEDGE-BASED ECONOMY

As mentioned above, a fundamental difference between the Anglo-American countries and Germany is the weak position of private universities in Germany. German universities are administrated and controlled by the Länder and cannot decide autonomously in many respect. The universities are publicly financed, they are independent of tuition fees and thus have only little incentive to adapt to the changing goals and priorities of their students (e.g., by changes in the curricula or by introducing new degrees). The public funding has the effect that the salaries for the scientists are predetermined by the tariff rate for the public services in general. The wage differential between the lowest and the highest salary group is relatively low. This means that successful scientists—by publishing and/or research funds—hardly can be rewarded by means of monetary incentives.

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<tr>
<td>Networking activities between scientific institutions and the city</td>
<td>• ‘Dresden – City of Sciences’</td>
<td>• ‘Museum of Science’</td>
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<tr>
<td>Networking activities between science and culture (museums)</td>
<td>• Joint projects between science institutions and museums</td>
<td>• BioMet Dresden</td>
<td>• R&amp;D cooperation</td>
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<td></td>
<td>• Art exhibitions in research institutes</td>
<td>• Silicon Saxony</td>
<td>• Competence centers</td>
</tr>
<tr>
<td>Networking activities between science and economy</td>
<td>• Public presentation of successful cooperation projects</td>
<td>• Long night of the sciences</td>
<td>• Daily page in the local newspaper(s)</td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>• Special program for university spin-offs</td>
<td>• Dresden Forum on Science and Society</td>
<td>• Exhibitions of research institutes</td>
</tr>
<tr>
<td>Presentation of research results to the local public</td>
<td>• Exhibition ‘Science for everyday’</td>
<td>• BioMet Dresden</td>
<td>• Technology park</td>
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<td></td>
<td>• ‘Quay of sciences’</td>
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<td></td>
<td>• Science corner</td>
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<td></td>
<td>• Science TV</td>
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<tr>
<td>Training and education of special groups</td>
<td>• Courses for pupils, students, and teachers</td>
<td>• Children university</td>
<td>• Courses for pupils and teachers</td>
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<td></td>
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<td>• Academy for elderly</td>
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<td></td>
<td></td>
<td>• Teacher education</td>
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<tr>
<td>Marketing for tourism</td>
<td>• Science center</td>
<td>• ‘City of aviation industries’</td>
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<tr>
<td></td>
<td>• ‘City of science’</td>
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A further regulatory barrier consists of the circumstance that German universities are not allowed to select its students on its own. In those cases of academic degrees (e.g., medical studies) where access is restricted, the students are centrally allocated by a federal agency (Zentralstelle zur Vergabe von Studienplätzen—ZVS, www.zvs.de); in the cases of academic degrees with unrestricted access the universities have to accept every applicant with a high school diploma (Abitur).

In the meantime, a number of universities dispose of technology transfer institutions. If this institution is located within the university, the transfer experts by rule are employed and paid by the university, this means usually independent from the transfer success. It is easy to imagine that a private agency, acting external of the public sector and paid dependent on transfer success might track down a lot more of transfer opportunities.

First Examples of Deregulating Efforts

In the year 2005, the foundation, Stifterverband, mentioned in section 1 started a model project called the deregulated university. Five universities in five Länder were selected and each of them funded for three years with a grant of 500,000 Euro provided that they should gain experience with enlarged autonomy. For this purpose, a partial exemption from the university laws of the five Länder had to be arranged. After the ending of the model project in 2007, the universities’ experience shall be reported and converted into a “code of good governance.”

North-Rhine/Westphalia is the first Land in Germany that has decided in 2006 to change the legal status of its universities from completely Land-dependent units to autonomous corporations under public law. This change is based on a new bill called, Hochschulfreiheitsgesetz (University Freedom Law) with the effect that in the future the university will get a lump sum transfer from the Land and decide on its own how to spend it (University Freedom Law, section 5). The new bill also involves a status change of the university staff from Land employees to university employees (University Freedom Law, sections 33-34), and the installation of a university supervisory board (University Freedom Law, section 21) with prominent scientists, entrepreneurs, and managers as members. This innovation shall help to enforce the university’s function for the economy and to strengthen the cooperation between firms and university.

After this short description of growth-inhibiting regulations effective in German universities and first deregulating experiments, some consequences for cities with universities and practicing an urban development policy with the goal of a knowledge city are discussed.

Handicaps for Cities Striving for a City of Knowledge Caused by University Regulations

German cities with an urban development policy centering around the factor, knowledge, can claim some good arguments:

- Facing the nationwide declining number of births, the only chance for the cities to increase their total population is migration. As a rule, cities with universities and colleges attract groups of younger people. In 1990, in the universities of Saxony-Anhalt, 10,000 students were enrolled; in 2004, this number has increased to more than 50,000.
- Besides the increase in population, which is important for the allocation of federal funds, the extension of universities and research institutes improves the opportunities for
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regional growth by science-enterprise cooperation, employment of qualified graduates and spin-offs.

- Cities that serve as a location for numerous scientific institutions normally have a positive image as cities with a high quality of life and are associated with an opulent endowment of soft location factors.
- Cities with an extensive stock of vacant industrial buildings have a good chance to revitalize these buildings by accommodating scientific institutions that are relatively flexible and uncomplicated in their required space conditions.

These potential advantages can be contrasted with some potential disadvantages:

- German cities with universities register not only a high number of in-migrating students, but also a disproportionate number of female graduates. Exactly this group of women shows the lowest birth rate in comparison to women with a lower educational level. This leads to the consequence that especially the middle-sized university cities (e.g., Bamberg, Heidelberg, Göttingen) belong to the cities with the lowest birth rates in Germany.
- For a city with the policy to increase the number and the funding of its scientific institutions, there will be a continuous insecurity about the regional profit—the growth effect—from this policy. There seems to be a paradox that with the rising reputation of a department or a scientist also the chance will increase that the knowledge produced by them will be exploited outside and not within the region of its origin. For scientists at universities of applied sciences, the chance is higher that they will cooperate with firms in their own region.
- Looking into the future, we have to be aware that in cities characterized by scientific institutions social inequalities will rise when the scientists—as the producers of knowledge—achieve a distinct higher social reputation and higher earnings. Whether these inequalities will lead to an enduring polarization and social conflict, will depend on the strategic and integrative capabilities of the city leaders.

In addition to these two potential disadvantages, a city planning strategy aiming at a knowledge city is confronted with the problem that the city’s university as a planning partner is operated by remote control of the Land. Planning with universities is a complicated process, because, besides city and university, a third player is sitting at the negotiating table. This also means that a city does not have influence on the profile of disciplines taught at the university, even in case of a mismatch between the disciplines and the industrial specialization of the local or regional economy.

The number and the reduced autonomy of the planning actors may have the effects that decision procedures become very heavy-going, that the locations of a university department or a research institute will not be selected according to city planning criteria, but by pure managerial criteria (which building can be run at lower costs?) or by pure chance (e.g., a certain piece of land is in property of the Land). In Germany, many universities are integrated in the inner city. The trend to transform these universities into campus universities (for the different architectural arrangements and spatial forms of German science-imprinted cities see Kühn, 2003; Kunzmann, 2004) only because the property prices are lower at the fringe, would diminish the university’s role as an important actor in urban development. Normally, universities situated in the inner city dispose of considerable portfolios of properties, frequently only administered, but not evaluated with respect to their potential for urban development.
CONCLUSION

Today we can find numerous hints that universities pay attention to the economic dimension of their production of knowledge and of human capital. We see technology transfer institutions, professors teaching entrepreneurship, a large number of technology parks, and other support institutions for startups and spin-offs, and—only recently—agencies for patent exploitation. Altogether, these institutions and activities are not yet nationwide. In Germany, we still can understand the scientific institutions as giants in chains. The chains consist of diverse regulations, with the universities being subject to the public budget law and to the standard wages in public service as the most momentous regulations. The universities are restricted to create their own income and to select their students according to their own standards. Probably a deregulated university could become more interested and a more active partner in urban and regional development.

Thus, today, we see only the beginning of a knowledge-based economy. A look to the US gives an impression of the dynamics that could be started with the help of deregulating measures. There are no signs, however, that such a dynamic knowledge-based economy would lead to more social equality. Several clues indicate that a knowledge-based economy will produce polarization and new social inequalities. If it might come true that in combination with the accelerated production of new knowledge the half-life of established knowledge would shrink drastically, the individual capability to maintain the achieved professional and social status would depend heavily on the own capacity and motivation to learn. We can foresee that not all of the individuals will stand this pressure for permanent and recurrent learning. Nevertheless, human capital cannot be transmitted in the same way as financial assets or real estate property; it has to be acquired completely new by each generation. At least this evidence seems to indicate that the knowledge society will become less structurally encrusted as its predecessors.

FUTURE RESEARCH DIRECTIONS

In this chapter, (a) important constituents of knowledge city strategies, (b) its political requirements, and (c) the role of regulations as a hindrance to knowledge city strategies have been explored. Altogether it can be resumed that approaches to formulate such strategies still are in a nascent state and require more research efforts to substantiate policy formulations and recommendations. These research efforts relate to:

- Comparisons between states with differing regulations concerning universities and research institutes.
- Comparisons between private and public universities with respect to their willingness to engage in knowledge city strategies.
- Evaluations of deregulating effects in those countries where deregulation reforms of the science sector take place.
- The interplay of the different policy levels involved in knowledge city strategies.
- The question, which actors should take a leadership role in the policy process.

The results of research oriented to these topics could help to formulate more differentiated strategies for cities trying to utilize the producers of scientific knowledge and of human capital located within their borders for a new path of urban development.

REFERENCES

From University Town to Knowledge City: Strategies and Regulatory Hurdles in Germany


From University Town to Knowledge City: Strategies and Regulatory Hurdles in Germany


ADDITIONAL READING


FROM UNIVERSITY TOWN TO KNOWLEDGE CITY: STRATEGIES AND REGULATORY HURDLES IN GERMANY


ENDNOTES

1 The foundation called “Stifterverband für die deutsche Wissenschaft” comprises more than 3,000 German enterprises as members. See its call for tenders on the Internet: www.stifterverband.de.

2 The majority of the students at universities of applied sciences are enrolled to graduate schools for social work financed by the Protestant or the Catholic church.

3 Universities, universities of applied sciences, research institutes of the Max Planck Society, Fraunhofer Society, Leibniz Association, and Helmholtz Association. The table does not contain the publicly financed research institutes directly submitted to the Federal government or to one of the Land govern-
ments. Normally the main task for these institutions consists of supporting governmental tasks and not publishing.


4 The Commission consists of eight representatives of the Federal Government and one representative—in matters of research promotion two representative—of each Land Government. The representatives of the Federal Government hold 16 votes, which are cast jointly, whereas the representatives of the 16 Länder governments hold one vote each.

5 The commission’s Web site http://www.wissenschaftskommission.de.


7 The five universities are: Technische Universität (TU) Darmstadt (Hesse), TU Dresden (Saxony), University of Göttingen (Lower Saxony), University of Heidelberg (Baden-Württemberg), and TU Munich (Bavaria). Details of the model project online: www.stifterverband.de/site/php/IRHUGHUXQJSKS"6,'VHLWH3URJUDPPSURJUDPPQUGHWDLODQVSUHFKQU2.

8 The text of the bill is available online at http://www.innovation.nrw.de/Hochschulen_in_NRW/Recht/HFG.pdf.

9 The strength of the German tradition conceiving universities as a primary arrangement of the state can be demonstrated by the fact that university employees in North-Rhine/Westphalia have sued the Land after the enactment of the bill being afraid of a diminished security of their jobs.
Chapter VII
Queensland’s Smart State Initiative: A Successful Knowledge Based Urban Development Strategy?

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ABSTRACT

During the last two decades, knowledge-based development has become an important mechanism for knowledge economies. In a knowledge economy, information and communication technology is extensively seen as a potentially beneficial set of instruments, which may improve the welfare and competitiveness of nations and cities. At present, both public and private actors aim to exploit the expected benefits of information and communication technology developments. These technologies offer unprecedented promise for social and economic development on all global, national, regional, urban, and local levels. Therefore, this chapter seeks to investigate the potential of information and communication technology policy at both regional and urban levels, and, in particular, to shed light on various factors that influence urban information technology policies in the public domain. The chapter sets out to explain the knowledge-based urban development processes and challenges and opportunities in information acceptance and use in urban policy-making in Queensland, Australia. This chapter draws on providing a clear understanding on policy frameworks and relevant technology applications of the Queensland Smart State experience.

INTRODUCTION

Many cities worldwide face the prospect of major transformation in the 21st century as the world moves toward a global information order (Castells, 2000). In this new era, already upon us, urban economies are being radically altered by dynamic processes of economic and spatial restructuring.
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(Graham & Marvin, 1996). The result is the creation of informational cities or with the new and more popular name knowledge cities.

For the last two centuries, social production had been primarily understood and shaped by neo-classical economic thought that recognized only three factors of production: land, labor, and capital. Neo-classical economics considered knowledge, education, and intellectual capacity as secondary, if not incidental, parameters of production (Knight, 1995). Human capital was assumed to be either embedded in labor or just one of numerous categories of capital. In the last decades, however, it has become apparent that knowledge in and of itself is sufficiently important to deserve recognition as a fourth factor of production. In the globalizing world, knowledge and information, and the social and technological settings for their production and communication are now seen as keys to development and economic prosperity (Lever, 2002).

The rise of knowledge-based opportunity has, in many cases, been accompanied by a concomitant decline in neo-classic industrial activity (Burton-Jones, 1999; Drucker, 1998). The replacement of physical commodity production by more abstract forms of production (e.g., information, ideas, and knowledge) has, however, paradoxically, reinforced the importance of central places and led to the formation of knowledge cities.

It is mainly in cities that knowledge is produced, marketed, and exchanged. Therefore, knowledge cities aim for a knowledge-based urban development (KBUD) that assists decision-makers in making their cities compatible with the knowledge economy and thus able to successfully compete with other cities. Knowledge cities provide their citizens with enabling conditions that foster knowledge creation, knowledge exchange and innovation (Ergazakis et al., 2004). They also encourage the continuous creation, sharing, evaluation, renewal, and update of knowledge.

To compete nationally and internationally cities need knowledge infrastructures (e.g., universities, research and development institutes); a concentration of well-educated people; technological, mainly electronic, infrastructure; and connections to the global knowledge economy (e.g., international companies and finance institutions for trade and investment). Moreover, knowledge cities must not only possess the people and things necessary for the production of knowledge but, as importantly, they must function as breeding grounds for talent and innovation (Windon & Berg, 2004).

The economy of a knowledge city creates high value-added products using research, technology, and brainpower. In the knowledge city, the private and the public sectors value knowledge, spend money on supporting its discovery and dissemination and, ultimately, harness it to create goods and services (Carrillo, 2006). Although many city initiatives call themselves knowledge cities, currently, there are only a few cities around the world (e.g., Barcelona, Delft, Dublin, Montreal, Munich, and Stockholm) that have earned that label. Many other cities aspire to the status of knowledge city through urban development programs that target KBUD (Ergazakis et al., 2004). Examples include: Copenhagen, Dubai, Manchester, Melbourne, Monterrey, Singapore, and Shanghai.

During the last two decades, KBUD has become an important mechanism for knowledge economies of cities. In a knowledge economy, information and communication technology (ICT) is extensively seen as a potentially beneficial set of instruments, which may improve the welfare and competitiveness of nations and cities. At present, both public and private actors aim to exploit the expected benefits of ICT developments. ICTs offer unprecedented promise for social and economic development on all global, national, regional, urban, and local levels. This chapter seeks to investigate the potential of ICT policy for KBUD at both regional and urban levels, and, in particular, to shed light on various factors that influence urban ICT policies in the public domain that targets transforming cities into knowledge cities.
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The chapter will set out to explain the KBUD and urban policy making processes in Queensland, Australia. This chapter will draw on providing a clear understanding on policy frameworks and relevant ICT applications of the Queensland Smart State experience.

The chapter consists of six sections. The first section following the introduction provides background information. The second section focuses on the KBUD processes in Queensland. The third section offers a comprehensive analysis of the Queensland Smart State initiative, and it also identifies actors and goals of the agenda of Smart State experience. The fourth section reviews knowledge-based development and ICT applications, and policies of the Queensland Smart State and Brisbane Smart City experiences, and their impacts on Brisbane’s successful KBUD. The fifth section discusses knowledge hubs and ICT developments within the Brisbane metropolitan area. Then the chapter concludes with future trends and conclusion sections.

BACKGROUND

In the information era, sustainable economic growth and development is highly associated with knowledge economies (Metcalf & Ramlogan, 2005). The term, knowledge economy, was first introduced by the OECD in 1996. A knowledge economy creates, distributes, and uses knowledge to generate value and gives rise to “a network society, where the opportunity and capability to access and join knowledge and learning intensive relations determines the socio-economic position of individuals and firms” (Clarke, 2001, p. 189). Rapid advances in ICTs during the last two decades established the infrastructure that enables the knowledge economy to scale up. The main novelty of the knowledge economy consisted of the need to manage an intangible asset that, in contrast to material resources, does not depreciate through use but rather becomes more valuable the more it is used (Laszlo & Laszlo, 2006).

According to Buckley and Mini (2000), a city’s knowledge economy is the economic wealth and well-being that results from the effective investment in people and ideas that create an environment where information, creativity, goods, and services are produced and exchanged, drawing on best practices. It requires a skilled labor force, up-to-date knowledge, effective use of technology (primarily ICTs), and broad city resources that foster a productive urban economy. In this process, communication, good governance, and partnerships are developed with all major stakeholders.

Emerging from analysis of the knowledge economy has been recognition by some of the role of creativity as the force behind knowledge (Corey & Wilson, 2006). Landry (2000), Florida (2005) and Henderson (2005) directed planners and urban administrators to think about the environmental and cultural assets of the cities and communities as economic resources. Corey and Wilson (2006) underlined the important role of ICTs in developing a knowledge economy and KBUD.

KBUD is a powerful strategy for economic growth and the post-industrial development of cities and nations to participate in the knowledge economy. It is a strategic management approach, applicable to purposeful human organizations in general (Carillo, 2002; Yigitcanlar, 2007). KBUD has two purposes: The first one is, it is an urban development strategy that codifies technical knowledge for the innovation of products and services, market knowledge for understanding changes in consumer choices and tastes, financial knowledge to measure the inputs and outputs of production, and development processes, and human knowledge in the form of skills and creativity, within an economic model (Lever, 2002). The later one is that, it indicates the intention to increase the skills and knowledge of people/residents as a means for individual and social development.
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(Gonzalez et al., 2005). KBUD policies includes: developing and adopting the state of art ICTs, distributing instrumental capital, developing human capital, and developing capital systems (Carrillo, 2002).

To date, the structuring of most of the knowledge cities (or creative urban regions) has proceeded organically; in essence, as a dependent and derivative effect of global market forces. Urban and regional planning has responded slowly, and sometimes not at all, to the challenges and the opportunities of the knowledge city. Therefore, in recent years urban planning has consolidated its interest in the paradigm of post-modern social production under the rubric of KBUD (Carrillo, 2004). Planning sees KBUD as a new form of urban development for the 21st century that could, potentially, bring both economic prosperity and sustainable socio-spatial order to the contemporary city. Therefore, in recent years urban planning has consolidated its interest in the paradigm of post-modern social production under the rubric of KBUD (Carrillo, 2004). Planning sees KBUD as a new form of urban development for the 21st century that could, potentially, bring both economic prosperity and sustainable socio-spatial order to the contemporary city (Yigitcanlar, 2007). The goal of KBUD is a knowledge city purposefully designed to encourage the production and circulation of abstract work (Cheng et al., 2004). KBUD also can be regarded as a tool or an approach to nourish the transformation and renewal of cities into the knowledge cities and their economies into knowledge economy (Yigitcanlar, 2005).

The globalization of the world in the last decades of the 20th century was a dialectical process. On one hand, as the tyranny of distance was eroded, economic networks of production and consumption were constituted at a global scale. At the same time, spatial proximity remained as important as ever, if not more so, for KBUD. Organizational proximity and institutional proximity, although mediated by ICT, and, in so far as they depend on personal contact and the medium of tacit knowledge, remain closely associated with spatial proximity. The clustering of knowledge production in cities is essential for fostering innovation and wealth creation.

The social benefits of KBUD extend beyond aggregate economic growth. On the one hand, is the possibility of a particularly resilient form of urban development secured in a network of connections anchored at local, national, and global coordinates. On the other hand, quality of place and life, defined not only by the level of public service (e.g., health and education), but also by the conservation and development of the cultural, aesthetic and ecological values that give cities their character, and attract or repel the creative class of knowledge workers, is a prerequisite for successful KBUD. The promise of KBUD is a secure economy in a human setting: in short, smart growth, or sustainable urban (and economic) development.

KNOWLEDGE-BASED URBAN DEVELOPMENT IN AUSTRALIA

Once Australia entered the information era and the new millennium, Australia needed to make a choice between two options for the continuum of her successful economy. The first option was competing as a low-wage economy based on the excellent, but now degrading, natural resource base by reducing wages, living standards, and environmental controls. And the second one was continuing with industries that are price takers in the global economy. Fortunately, Australia has chosen the later one, which is to be part of the emerging knowledge economy, an economy that has an emphasis on the use and dissemination of information as the basis for innovation, competitiveness, and growth (Marceau et al., 1997). Ruthven (1999, p. 20) has found that:

Australia is moving from a period of sweeping change in the structure of its industries. The enterprises, their activities and their importance to the economy differ significantly from the position 50 years ago and show radical changes from the position that existed at the beginning of the [last] century.
Mainly because of the high level of knowledge base, business research and development (R&D), government support for business R&D, total investment in knowledge, communication and electronic commerce and venture capital, in many respects, Australia is well-placed to compete in the global knowledge economy. Australia’s prime strengths revolve around the following three key factors (McKeon & Lee, 2001, p. 65):

- A reasonable strong knowledge and technology base.
- A number of competitive industries linked to that knowledge base.
- A rapid process of adjustment over the past two decades to new global realities.

The KBUD process in Australia comprises six interrelated components. These are (Munro, 2000):

- Information technology (usually considered to encompass computing and communication technologies—ICTs).
- Information networks.
- New industry processes (including innovation, research and development, and technological diffusion).
- The human (and also social) capital.
- Capital accumulation through the privatization and commercialization of knowledge.
- Strategic urban management (metropolitan planning, knowledge precinct development—including work, residential and recreation areas).

Gleeson and Low (2000) argue that production in, and development of, the Australian city should be structured by the dynamics of the global economy. Recent statistics indicate that Australia and its state capitals are well-placed to take advantage of the knowledge economy. Australia rates above the OECD average for most of the indicators of readiness to move toward a knowledge-based economy. Knowledge-based industries account for 48% of Australian GDP (B-Hert, 2004).

Marceau (2005) contends, however, Australian policy makers are, in the main, content to repeat received KBUD wisdom. The cluster approach, based on the perception of the U.S. experience (e.g., Silicon Valley and DNA Valley), is particularly in vogue. Marceau’s research, however, shows the geography of high-tech industry in America to be neither an accident nor a simple process, and hence not easily replicated. Effective knowledge policy needs to be flexible enough to capture the advantages of Australian industrial, intellectual, and socio-economic and urbanization history.

To date, no Australian city has been recognized as a knowledge city. Melbourne, Sydney, and Brisbane are three leading Australian cities in competition to become the first Australian knowledge city, although Melbourne is much closer to such recognition than the other two (Ovalle et al., 2004). Melbourne has a considerable advantage in this competition, as since the 1990s, Melbourne City administration was well-aware of the KBUD processes, and municipal strategies already are developed and applied for the knowledge-based development of the city (Yigitcanlar, 2005). One of the strategy tools for the knowledge-based development in Melbourne is the city plan. The 2010 Melbourne City Plan aims to shape the future of the city as a prosperous, innovative, culturally vital, attractive, people-focused, and sustainable city (Shaw, 2003). Another strategy tool, the metropolitan strategy plan for Melbourne, Melbourne 2030, builds on the similar visions for the city by focusing on nine key directions, which are: a more compact city; better management of metropolitan growth; networks with the regional cities; a more prosperous city; a great place to be; a fairer city; a greener city; better transport links; and better planning decisions and careful management (Victorian Government, 2002). Following Melbourne’s lead, the state and city administra-
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...isions of Brisbane and Sydney also adopted similar vision and goals in their metropolitan and city plans (Yigitcanlar, 2007).

Although a relatively small city by international population standards, Sydney is actively involved in the global economy. Its capacity to create and sustain global connections supports the premise that connectivity, rather than city size, determines economic success in the global context. However, until recently, Sydney did not have a comprehensive metropolitan development strategy because of its fragmented municipal nature. The new metropolitan strategy (Sydney in 2031) emphasizes innovation and acknowledges that increasingly, global competitiveness depends on investment in knowledge and innovation, and aims to strengthen and support the economic competitiveness of the city by knowledge-based development (NSW Government, 2005).

The rapid population growth and urban development in Brisbane and its metropolitan region, South East Queensland (SEQ), during the last decade have led state government and Brisbane City Council to develop a new KBUD strategy, Smart State Strategy, for the city and the state. The following section discusses this policy and some of its implementation in detail.

THE QUEENSLAND SMART STATE STRATEGY

In terms of overall economic measures, Queensland is an outstanding performer and has been Australia’s fastest growing regional economy over most of the last decade. Economic growth in Queensland has exceeded that for Australia for the last nine consecutive years, and Australia itself has been acclaimed as one of the fastest growing economies in the OECD (Greenfield et al., 2006).

In 1998, Queensland was developing an extensive knowledge infrastructure centered on nine universities and research agencies. Queensland also had emerging capabilities in niche areas, such as ICT, nanotechnology, neuroscience, forensics, sports science, and eco-tourism, as well as continuing her competitiveness in food and agribusiness, aviation and aerospace, mining, marine and environmental technology industries. However, many of the developments were not coordinated, and there was insufficient recognition of these sectors’ potential to generate wealth. The Queensland government recognized that greater levels of investment were needed to boost Queensland’s knowledge infrastructure and take advantage of the state’s potential. In August 2003, the government released the Smart State Strategy prospectus, Queensland the Smart State—Investing in Science: Research, Education and Innovation, charting the government’s investments in science, technology, research, and innovation over the next five years. The prospectus outlined the government’s commitment to achieving the Smart State vision, stated the vision as using knowledge to drive economic growth, and charted future directions and new initiatives in nine key strategic areas (Queensland Government, 2004, p. 4):

- Using knowledge to drive economic growth
- Skilling the Smart State
- Providing Science education
- Building Queensland’s scientific and research facilities
- Commercializing discoveries and innovations
- Harnessing smart science for the environment
- Managing the knowledge and information economy
- Using government agencies to drive research and innovation
- Establishing strategic partnerships

The Smart State strategy comprises a number of initiatives for providing a stimulus to boost...
industry innovation and commercial capacity for greater global export and trade gains. The aim of these initiatives is targeting the mobilization of the innovation process by providing support in converting ideas into tangible results. These initiatives include the funding of: innovation building, Smart State research facilities, innovation skills, and innovation projects. The total amount of public funding provided over a four-year period for these projects is approximately $220M (Queensland Government, 2005a).

Key initiatives for building the Queensland brand through expanding on strengths, successes, and recognition to take Queensland to the world include (Queensland Government, 2005a):

- Smart Sector Strategies to grow priority industry sectors.
- Smart ICT—Taking it to the World—to grow the ICT industry and exports.
- Queensland Aquaculture Development Initiative—$4M over four years.

Key initiatives for making the right connections by investing in strategic alliances and networks include (Queensland Government, 2005a):

- Smart State council to provide advice on emerging trends in innovation and skills.
- International Collaborations Program to support strategic alliances.
- A virtual forum for Queenslanders to shape the future Smart State agenda.

As well as providing an immediate stimulus for innovation, Smart Queensland takes the long-term view by building Queensland’s capacity as an innovative society. Investing in knowledge and skills requires a new approach in learning and education that equips people with the knowledge, technology, skills, and abilities necessary to succeed in an innovative society. Key initiatives in the field of learning and education include: the Smarter Learning project, which is a consistent approach to assessing and reporting across all Queensland schools; the Smart Classrooms project that provides access to learning beyond the traditional school grounds; and the Smart Academies, which is the centre of excellence in science, mathematics, technology, and in creative arts (Queensland Government, 2005a).

Creation of new knowledge-intensive jobs and skills are among the major requirements of the knowledge economy, therefore, training and higher education system enthusiasm about innovative enterprise and partnership with industry is a must. Key initiatives in this area include (Queensland Government, 2005a):

- Modernize the vocational and education training system to deliver flexible and responsive training.
- Smart State University internships to assist students to become work-ready.
- Skilling Solutions Queensland—a one-stop shop providing free training and career advice.

To achieve KBUD and to be competitive in the global markets, the Smart State strategy also aims to attract international investment and knowledge workers as well as improving its residents skills through training, and providing incentives to Australian investors. Investing in diversity, creativity, connectivity, and sustainability is another important aspect of creative urban regions. Therefore, Smart Queensland aims to increase Queensland’s appeal as a place to live, study, work, and play, by creating a dynamic Queensland, building a community that cares for its people and fosters and celebrates knowledge and creativity. The key initiatives are categorized under three main groups. The first one is the “Business and Skilled Migration Program,” which aims to promote Queensland’s appeal to skilled knowledge workers. The second one is “building the multicultural image of the state” by organizing festivals to celebrate Queensland’s
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Sustainability and smart use of our natural resources is an integral part of the Smart State Strategy and includes the following initiatives (Queensland Government, 2005a):

- Premier’s taskforce to develop a Sustainable Natural Resource Development Strategy.
- International Water Centre—$2.4M over four years.
- Innovative research to control the cane toad—$1M.

The Smart State Strategy is mainly about positioning Queensland economy as a modern knowledge economy, recognizing knowledge, science, technology, research, education, and innovation as key drivers of economic growth. It also aims to achieve knowledge-based development and KBUD through a wide collaboration between public-private-academia partnership and including all stakeholders and interest groups into the decision-making process as active actors.

Most of the initiatives have targeted enabling technologies as applications of enabling technologies are critical to the sustainability and globally competitiveness of Queensland’s important traditional industries—such as agriculture and mining—based in the regions, and for the growth of emerging industries, such as ICT, biotechnology, nanotechnology, smart materials, aviation and aeronautics (State Development and Innovation, 2004). These initiatives and the Smart State Strategy (Figure 1) have a strong pushing power in positioning Queensland economy as a knowledge economy.

The Smart State Strategy plays an important role in facilitating the development of ICT and learning communities in Queensland. The strategy initiated an “e@ble project” to establish an industry internet portal and share relevant information between all levels of government,

Figure 1. The Smart State Strategy (Queensland Government, 2005a, p. 13)
ICT providers, developers, and communities (Queensland Government, 2006).

The SEQ Regional Plan 2026 also supports the Smart State Strategy. This plan represents a Smart State way of planning in this region. The economic development initiatives reflected in the Regional Plan are underpinned by the Queensland Government’s Smart Queensland: Smart State Strategy 2005-2015. This strategy “identifies investment in research, development, technology diffusion and commercialization of ideas. It also includes investments in knowledge, skills, diversity, creativity and connectivity as the key mechanisms to achieve increased productivity and a better quality of life” (SEQRP, 2005, p. 82).

The Regional Plan aims to foster innovation and develop skills and technological capabilities in the region to support existing and future industries by: (1) Developing an accessible range of regional education and training infrastructure and programs that encourage workforce participation, respond to specific regional industry needs, and support skills development in the workforce and broader community; and (2) Supporting existing and emerging clusters of science, innovation, and research and development (SEQRP, 2005, p. 86).

THE ROLE OF ICT IN KNOWLEDGE-BASED URBAN DEVELOPMENT

Brisbane is the capital city of Queensland and the fastest growing state in terms of economy, urban development, and population within Australia. Although there are few knowledge-intensive industries located, and some limited KBUD initiatives are planned for Cairns and Townsville (Northern Queensland), most of the KBUD in Queensland occurs within the Brisbane metropolitan area (South East Queensland).

The use of ICTs in inter-organizational communication, in information-sharing and data management is key to achieve cities’ agendas, in terms of KBUD, delivery of services, and outcomes through social integration. Similar to Queensland’s Smart State Strategy, the City of Brisbane also has adopted a 10-year Smart City vision aimed at addressing and promoting the following: information access; lifelong learning; the digital divide; social inclusion and economic development. The operationalization of Queensland’s Smart State and Brisbane’s Smart City initiatives from one centre for each promotes overall integration of various local and statewide e-governance initiatives. The city and the metropolitan region are well-integrated in terms of service delivery, the infrastructure for which is underpinned by the telecommunications plans, with social integration addressed through the various initiatives. Integration is facilitated largely through a strong state government and city council—with a clear policy framework and well-resourced staff (Odendaal, 2003).

If ICTs are to function as tools for development, then skills development and improved access are key to achieving this. Underlying this technical development is the importance of social development—literacy training, public computer access and creating opportunities for participating in the ICT industry. Brisbane’s efforts in this regard are based around partnerships with state government in providing training in schools, with small scale businesses in providing cheap hardware, and with small information technology businesses in implementing www.ourbrisbane.com portal for participation (Odendaal, 2003). The www.ourbrisbane.com project is promoted as an icon in itself; it is marketed aggressively as a key component of the Smart State and Smart City initiatives. It is seen as an underpinning to all of Brisbane’s long-term objectives and emerged as a project, in response to the need to make Brisbane a competitive city, nationally and regionally. Given the city and region’s reliance on the service sector for growth, enhancing its function as a key
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Queensland’s Smart State Initiative: A Successful Knowledge Based Urban Development Strategy? service center through ICT development is seen as strategic and important for KBUD.

Brisbane shows the synergy that can come from public-private partnerships (private partners in www.outbrisbane.com, in providing access for communities to inexpensive hardware), from networks with other state agencies, such as State Education in providing various initiatives and internet training; and working with federal and state government in establishing opportunities for one-stop service payment and registration online around life-events (Odendaal, 2003). This synergy is combined with the strong local economy and lifestyle options to attract more knowledge-intensive industry and workers, which supports KBUD within the region.

Queensland’s Knowledge Hubs

A feature of globally competitive knowledge economies is that governments, universities, and industry work together in these economies to create regional knowledge hubs. Knowledge hubs have three major functions: to generate knowledge; to transfer and apply knowledge; and to transmit knowledge to others in the community through education and training (Dvir & Pasher, 2004). The Queensland Smart State and Brisbane Smart City strategies have augmented KBUD in and around Brisbane (Table 1). Brisbane and its metropolitan area (South East Queensland) have emerging strengths in a number of dynamic new sectors and knowledge hubs that will help drive the regional capacity to develop into the future. Biotechnology and biosciences, in general, aviation and aerospace and ICT, in particular, are examples of strong development opportunities that have the potential to make Brisbane a global player in the world’s fastest growing knowledge-intensive industries (Andrews, 2006).

The Brisbane central business district and surrounding suburbs are home to globally recognized knowledge hubs and clusters, such as Herston (medical research) and Kelvin Grove (creative industries, health). The ICT sector is developing in Milton and Fortitude Valley, with government representation in the iLab incubator (Toowong) and Information Industries Board (Milton).

Table 1. Major knowledge hubs in Queensland (Rayner, 2006)

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of knowledge industry</th>
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<tbody>
<tr>
<td>Cairns to Townsville James Cook University</td>
<td>Tropical sciences Tropical ecotourism Tropical health Aquaculture Disaster prevention Environmental sustainability</td>
</tr>
<tr>
<td>Boggo road University of Queensland Prince Alexander Hospital</td>
<td>Biotechnologies and Biosciences Health and food sciences Nano technologies Brain Institute Pharmacy sciences</td>
</tr>
<tr>
<td>Creative industries Queensland University of Technology Griffith University Millennium Arts</td>
<td>Collaborative arts Film and television Visual and performing arts Asia Pacific Triennale</td>
</tr>
<tr>
<td>Royal Brisbane Hospital</td>
<td>Queensland Medical Institute Children’s and Women’s Health</td>
</tr>
<tr>
<td>New knowledge precinct proposals @ Sunshine Coast—Brisbane—Gold Coast</td>
<td>Subtropical urban renewal Urban waterfront development Sustainable housing and living</td>
</tr>
</tbody>
</table>
Substantial activity also is centered around the University of Queensland at Santa Lucia with a range of research facilities, including the Institute for Molecular Bioscience and a natural resources/environmental cluster nearby at Indooroopilly Longpocket. A similar concentration is located south of the city, with Griffith University at Nathan, the nearby Mt. Gravatt Research Park and Brisbane Technology Park at Eight Mile Plains. Emerging clusters are apparent at the Sunshine Coast, based on the University of the Sunshine Coast (at Sippy Downs), and at the Gold Coast with the Griffith University campus and the proposed Knowledge Precinct. The Gold Coast also is home to a thriving ICT industry and enterprises associated with leisure and entertainment (Queensland Government, 2005b, p. 49-50).

Elsewhere in the region, there are specialist centers of research and development at sites such as Pullenvale (minerals and energy), Coopers Plains (pathology, bio-security) and Cooroy (timber). The ongoing development of University of Queensland campuses at Ipswich and Gatton will be a key factor in diversifying that area’s economic activity, as well as increasing access to education and training in the Western Corridor. Urban redevelopment areas, particularly knowledge precincts such as Boggo Road/Dutton Park, provide the opportunity for mixed-use development, incorporating high value-added research, development, and service industries, and linkages to university research facilities. Such developments have the potential to encourage industry clusters, which can be located either in close proximity or more distant proximities, but connected by high-speed broadband and equipped with other ICTs (Queensland Government, 2005b, p. 50).

**CONCLUSION**

Knowledge cities feature growth based on the generation of value using common assets with the purpose of achieving sustainability. The advantages of a knowledge city at global, national, regional, and local scales cannot be ignored by the city authorities, policy-makers, private sector investors, and social organizations. Knowledge city strategies and KBUD policies have been adopted by a number of cities and regions since the late 1990s.

Knowledge cities are complex entities, and attempts to transform cities into knowledge cities will likely result in failure if they are not guided by sound strategic visions. These strategic visions should incorporate policies for attracting and retaining knowledge workers and industries, and also for empowering citizens as knowledge creators and innovators. The top-tier knowledge cities specialize in a few sectors only, but set ambitious goals for each, and they also develop their knowledge-based policies carefully (Yigitcanlar, 2007).

The common strategies for building successful knowledge cities include: political and societal will; strategic vision and development plan; financial support and strong investments; setting-up of agencies to promote KBUD; international, multicultural character of the city; metropolitan webportal; value creation to citizens; creation of urban innovativeness engines; assurance of knowledge society rights; low-cost access to advanced communication networks; research excellence; and existence of public libraries’ network (including online availability of resources).

Implementation of the above-mentioned strategies and policies for knowledge cities and KBUD requires a broad intellectual team with expertise in urban development; urban studies and planning; socio-economic development; models of intellectual capital; and knowledge management. It also requires understanding the diverse spatial forms of the knowledge city where a large number of knowledge clusters are particularly important in the promotion of the spill-over effects found to be vital for long-term economic prosperity (Yigitcanlar, 2007).
Strengthening the knowledge-base of cities also requires a nuanced geographical frame that allows understanding in diverse spatial forms of the knowledge city, where a large number of knowledge-based clusters (e.g., universities, R&D institutions, and knowledge precincts) are particularly important in the promotion of the spill-over effects found to be vital for long-term economic prosperity.

It is evident from the Queensland’s Smart State and Brisbane’s Smart City strategies and vision that Queensland and, particularly, Brisbane have the required potential that is mentioned above. In Queensland and Brisbane the state and local governments have and are developing strong urban ICT policies and KBUD strategies to strengthen the knowledge-base of the state and the city. Successful implementation and continuum of these strategies would likely transform Brisbane into a globally competitive knowledge city, and its economy into a knowledge economy. So far, there are some positive outcomes of KBUD (i.e., economic prosperity, human development, and moving toward social and environmental sustainability) in Queensland. However it is still rather early to comment on how successful Queensland’s Smart State strategy would be.

FUTURE RESEARCH DIRECTIONS

In recent years, a new global urban order is being shaped by the growth of technology and knowledge economy (Slabbert, 2006). The importance of KBUD will increase in the near future as technology and economy continue to shape a new urban order, and competition between cities gets much tougher in order to attract and retain knowledge-intensive industries and workers.

To date, there has been limited research on the specifics of KBUD in Australia. Most of the research has been of a general economic character or narrowly focused on Australian knowledge precincts (e.g., ABS, 2002; DITR, 2002; Joseph, 1997; Sheehan et al., 1995). The socio-spatial dimensions of KBUD, and relevant social research that investigates such parameters as the quality and quantity of the knowledge workers, have been largely neglected. Other KBUD areas of relative neglect include ICT research (e.g., GIS, e-government, internet, online public participation) and policy-making and ICT adoption by state and local governments’ planners (e.g., NIEIR, 2005; Yigitcanlar, 2006; Yigitcanlar et al., 2003). Therefore, further research that focuses on these neglected and underdeveloped research areas to determine key factors in transforming Australian cities into knowledge cities needs to be undertaken.

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ADDITIONAL READING


Chapter VIII

22@bcn Plan:
Bringing Barcelona Forward in the Information Era

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Universitat Oberta de Catalunya, Spain

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ABSTRACT

Barcelona has been internationally recognized for its exemplary urban regeneration policy since the Olympic Games of 1992. By that time, the so-called Barcelona model was not only about urban planning and new economic strategies, but about urban culture and social participation as well. After a period of stagnation, the new orientation of the municipal policy points to a more entrepreneurial logic. The growing role of private initiatives and the inclusion of information and communication technology in local policies are questions that affect the definition and shape of the new city, as well as the theory and practice of its governance. The “22@bcn Plan” is one of the highlights of Barcelona’s change into a city of knowledge. This chapter asks whether and how this specific plan challenges the well-known Barcelona model.

INTRODUCTION

Between 1986 and 1992, Barcelona experienced one of its greatest periods of urban transformation. The urban policy implemented during that time was a successful combination of urban planning initiatives and the spread of a discourse based on local and global promotion of a new urban image for the city. Led by the public administration, and with almost unconditional popular support, this process became internationally known as the Barcelona model of urban transformation. After
some years of apparent deprivation, a second wave of urban policy came to the city. It was, again, a combination of urban physical changes and an appropriate discourse based on the general principles of what has become known as the city of knowledge.

At the end of the 1990s, Barcelona opened its doors to the new global model of knowledge-based urban development. This time, the challenge consisted of promoting new economy and cultural industries (Gdaniec, 2001; Selfa, 2005). The city’s new economic activities (categorized as @ activities) included cultural and ICT industries, digital services, and knowledge centers (Clos, 2004; Partal, 2001) (see Table 1).

Barcelona, like other former industrial cities in Europe, started to adapt its urban structure to the changing productive requirements of late capitalism (Olivella, 2000; Clua, 2005). The spatial emplacement for such urban transformation was the city’s former industrial neighborhood (once called the Catalan Manchester): Poblenou.

Poblenou’s regeneration strategy was called 22@bcn Plan. The development of the Plan has involved the strengthening of economic actors (mainly private agents) with a growing role in the city’s redefinition. Today, the city is noticeably reoriented toward a major emphasis on the innovative spirit of urban entrepreneurial leadership, rather than on the inclusion of public participation in the regeneration process. In fact, the entrepreneurial turn clearly is questioning public-oriented urban policy, as representatives of the private sector already have discussed with local authorities the possible end of the Barcelona model (Capel, 2006).

In relation to entrepreneurial logic taking over the City Council’s function as a state agent, Boixader (2004) has stated:

“We have been talking about the public initiative in the promotion of [Barcelona’s] transformation. But this initiative is moving on a much reduced field of alternatives, which could be interpreted as proof of the public power’s alignment with market forces. (...) If land re-qualification has had such an important dimension it is because industry and the working class population reduce the value of real state operations” [Authors’ translation].

The content of this chapter is structured in four parts. The next section includes the background concepts that are central to the analysis of Barcelona’s new urban model. Following this section, the Barcelona model will be briefly presented. The definition of this urban model is highly relevant, in that it allows a better understanding of the further evolution of public-private partnerships in Barcelona. Then, the 22@bcn Plan will be introduced, by first locating the Poblenou district in its historical context. Attention will be focused on the gap between the economic success that the plan aims for, and the social responses that the plan has received. The chapter concludes with final remarks and some reflections on future trends.

This chapter has three main objectives. The first one is to shed light on the changing role of public and private initiatives as far as Barcelona’s knowledge-based urban development is concerned. Second, the paper aims to introduce

Table 1. Barcelona’s new economy: emerging economic sectors

<table>
<thead>
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<th>Services</th>
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<td>services to firms</td>
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<td>tourism</td>
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<td>Real estate</td>
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<td>digital services</td>
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<td>ICT industries</td>
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<tr>
<td>cultural industries</td>
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<tr>
<td>research (R+D)</td>
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<td>Finance</td>
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</table>
the question of social participation in the urban planning process. The chapter’s last objective is to contribute to critical reflection on possible controversies surrounding knowledge-based cities. Through a closer look into Barcelona’s case, we would like to introduce the idea that current challenges for urban policies/politics include not only the economic question, but also (and importantly) the social and the cultural.

BACKGROUND: CONTEXT AND CONCEPTS

The contents of this chapter are the result of the work carried out by the authors in many different research projects, both theoretical (on ICT, knowledge society, urban social and planning changes, and governance), and on the specific case of Barcelona (urban planning, citizens’ participation, ICT policies, and the transformation of the public sphere). The authors have reviewed all literature available on Barcelona’s recent urban experiences and have benefited from the wide range of interviews with experts, technical staff, municipal authorities, and citizens, which have been key information sources in their respective investigations. They also have been involved in institutional as well as civic advisory groups.

What makes Barcelona interesting is not only its privileged situation as a city where global and local processes of urban regeneration meet, but rather, more importantly, the city offers the opportunity to acknowledge the different urban models that result from its charismatic combination of social-historical conditions and innovative transformation. The starting point of the analysis here is that urban changes are never exempt from conflict.

Following this core idea, the chapter remits to previous works developed from a critical perspective. Thus, the concepts that structure the argumentation are taken from recent theoretical debates on what does knowledge-based urban development apply to, and whose city is being defined through this discourse.

Urban Development and the “Entrepreneurial Turn”

Today, more and more local governments are adopting the global trend of entrepreneurialism as the natural and unavoidable evolution toward a post-industrial era and a competitive future. Cities governed by left-wing parties, such as Barcelona, follow this direction as well (McNeill, 2003). Some authors (Leitner & Sheppard, 2002; Mole, 1996; Quilley, 2002; Tewdwr-Jones & McNeill, 2000) already have made firm criticisms of this linear way of looking at the city’s transformation.

The so-called post-carbon economy has become the new discourse on urban renaissance closely linked to the principles of the entrepreneurial turn and the rise of a creative class (Landry, 2000; Florida, 2002). However, according to other authors, this perspective leads to a very simplistic understanding of urban evolution, as it affirms that ICT-based economic activities are the necessary result of the existence of a knowledge elite in the city (Markusen, 2006; Markusen & Schrock, 2006). Thus, the question of not detaching economic policies from social policies appears to be crucial. According to Jessop (1997, 2002), the emphasis on entrepreneurial and innovative spirit often misses the important role that redistribution and social cohesion play in urban regeneration strategies.

Entrepreneurial logic is, thus, not only a hegemonic global trend (Hall, 1988; Harvey, 1989), but also a practice that is prevailing over other possible ways of understanding the urban revolution (Holden, 1999; Peck & Ward, 2002). The entrepreneurial turn has much more to do with the blossoming of a new technocratic elite than with a real transformation of the city’s social and structural conditions. This has had harmful consequences for the recognition of urban culture and knowledge not only as an economic
capital (O’Connor & Wynne, 1996), but also as a social capital as well (Zukin, 1995). As a result, the non-skilled labor force (now increasingly made up of immigrants of African, Asian, and Latin American origin), as well as many social networking practices, are relegated to hardly visible spaces in European cities, in general, and Barcelona, in particular.

THE BARCELONA MODEL

After the first local democratic elections in 1979, the search for new engines of economic growth became the dominant note in new urban policy. Having managed to reach a maximum degree of co-operation with both other public administrations and the private sector, municipal policy in these years fell halfway between liberalism and interventionism (Trullén, 1988).

The unfurling of this new urban policy was essentially carried out through two aspects, which are so closely related that they are frequently indistinguishable: the design and implementation of a new urban planning, which brought with it a major physical transformation of the city, and an explicit discourse of producing images of the city (Benach, 2000; Benach & Albet, 2005). Both aspects were combined in an exceptional way in a special event: the organization of the 1992 Olympic Games.

The Transformation of the City

Thus, the 1992 Olympic Games became the strategy chosen to tackle the lack of investment coming from private initiatives. Above all, urban policies focused on the improvement of public facilities and infrastructure. That led to the consolidation of a basic transportation network, as well as to the construction of ring roads, enlargement of the port, re-organization of the airport terminal, the spread of telecommunications, and so forth. (Marshall, 2004). The Olympics also were the new pretext for raising the city’s international profile, as well as an effective tool for strengthening social cohesion and the sense of belonging to the city. In this way, an athletic event such as the Olympic Games

Table 2. Building a model: the “Barcelona experience” in nine points (García-Ramon & Albet, 2000)

- Basic role of public spaces (streets, squares, services, infrastructure, facilities, etc.) as characteristic elements qualifying urban changes. These spaces were used to encourage changes in private spaces, and generate identity and social and cultural integration.
- Full leadership of the local public initiative (municipal administration) for the design and management of urban transformation projects, even in those investments that were mainly of private origin.
- Strict compliance with the existing Urban Master Plan and with pre-established town planning regulations; an effort was made in order to maintain coherence, credibility, and legitimacy of the transformations, based on designs and previous agreements, and not on proposals that could appear temporary or opportunistic.
- Keeping a global vision of the city despite the exceptional aspect of some of the projects and events (such as the Olympic Games).
- Introduction of a complexity of functions in land uses in the newly built areas, in order to avoid marginal social zones or others with social functional specialization.
- Urban renewal and rehabilitation avoiding gentrification and aiming to maintain social coherence in affected neighborhoods.
- Dignifying the peripheral areas.
- Citizens’ implication in the project of urban transformation. “Volunteer” as an important role.
- Positioning of Barcelona within the world’s context and, especially, among large cities, thanks to strategic urban marketing promotion based on creating and encouraging city lobbies.
became the platform for achieving the major objectives for Barcelona (Forn, 1992). The features that characterized the city’s urban transformation project in the period 1986-1992, constitute what has come to be known as the “Barcelona model” of urban policy (see Table 2).

Thanks to the Barcelona model, the city assumed the challenge of becoming the showcase of the world (Benach, 2000; Zabalbeascoa, 2000). Thereby, urban planners from all over the world look at Barcelona for inspiration about what a vibrant city looks like. One of the high moments of this international recognition came in 2000, when the Royal Institute of British Architects (RIBA) awarded the city with the Royal Golden Medal, being the first time that RIBA chose to reward a whole town-planning strategy (Cobb, 1990). The transformation of the city was certainly spectacular (Benach & Albet, 2005). The model also had clear political guidelines, such as giving priority to both public initiative and public space. This strategy was conceived as an attempt to achieve the challenge of combining architectural renewal with due respect for the city’s historical landscape and, above all, social involvement.

**THE 22@BCN PLAN**

The 22@bcn Plan is an innovative, complex and dynamic project that goes beyond the limits drawn on the map, and that so far has been sufficiently flexible to secure its own survival. This has been possible through the convinced role of several professionals and counselors who defended the need to promote productive activities related to the ICT sector. The incentive of a greater built-up surface capability has opened the door to the participation of landowners and promoters in the Plan. Finally, local social movements (through their critical insights) complete the list of involved agents. The process shows, on the one hand, the importance of public initiative. It also demonstrates that the lack of political leadership and popular participation can hamper the adequate development of the Plan.

**Poblenou: A Changing District**

The first settlements for economic activities in the Poblenou district (where 22@ area is now located) date from the beginning of the 19th century, when several textile factories were placed in this area. The availability of underground water supplies and the huge extension of land made possible rapid growth of both factories and worker population. Poblenou became well-known as the Catalan Manchester due to its industrial concentration and its factories integrating the whole productive process. Living conditions in Poblenou were even harder than working conditions. This situation led to a very active social and political life (civic centers, cooperatives, etc.) with strong worker’s associations. The beginning of the fascist dictatorship in 1939 interrupted this social, political and cultural vitality. It was not until the 1960s that some recovery took place through the clandestine worker’s union, Comissions Obreres (AHP, 2001).

The 1953 Barcelona Regional Plan established the limits of the industrial expansion of the city, clearly differentiating between housing and industry. It also allowed huge new housing estates that quickly became “vertical shanty towns” near Poblenou (Besòs, la Catalana, Maresme), deeply increasing deficits in basic facilities (schools, hospitals, sewage, public transportation, etc.). Besides this situation, as of the late 1960s, and due to a general industrial crisis, many companies closed down or migrated to other cities; hundreds of workers became unemployed and some parts of the district became derelict. Significant neighborhood claims were raised at that time, jointly with the activism of some planners, professional associations, and anti-fascist political groups.

With the arrival of democracy in local Spanish governments in 1979, Barcelona’s municipality assumed some of the popular vindications, but
the bulk of urban changes took place after 1986, when Barcelona was nominated for the 1992 Olympics. The Olympic Village was placed in the most convenient zone of the Poblenou district, creating a new waterfront that included new gardens, beaches and part of the ring-road. In late 1990s, new basic facilities were placed in the district—the Catalan National Theatre, the Music Auditorium, commercial malls, and the opening of the final part of the Diagonal Avenue to the sea-front—allowing great private estate investments in old derelict areas and, as a result, completely changing the social and physical appearance of the district. During this process new activities arrived: old factories were occupied by artists because of space availability and comparatively low prices (Palo Alto, Hangar); some research and university centers also begin to settle in old factories, and still others were converted into lofts or fashion bars and discos.

**Toward the Pl@n**

After the Olympic Village, the ring road and the new beaches were built, it became evident to real estate promoters that the area had huge investment potential, considering it as the last opportunity for a major land provision in downtown Barcelona. Besides this view, neighborhood associations maintain the need for a global renewal of Poblenou upon consideration of the problems of derelict industrial uses and municipal abandonment.

In 1995 and 1998, two official drafts (Gabinet d’Estuds Urbanístics, 1995; Departament d’Urbanisme, 1998) drew the main lines for future urban planning actions: some degree of continuity with the pre-existent street grid; maintenance of economic activities but changing them mainly to high-tech industries, productive services, and art and design applications; attraction of research centers and university faculties; localization of new cultural facilities and activities. Morphologically, the proposal suggests complex blocks mixing industry, residence, and services. The main intervention criteria proposes to take advantage of the new locational strategy of ICT-related industries; to fight against increasing polarization and imbalance in the metropolitan workforce market; to solve the illegal status of pre-existing housing and to provide new housing.

In the meantime, a digital lobby appeared on the scene having as its main goal to transform Poblenou into a major site of technological revolution. The lobby was promoted by the Institut Català de Tecnologia (a private institution devoted to professional promotion of engineering and engineers, which was a pioneer in the rehabilitation of old factories for new service uses) together with economists, urban planners, and other businessmen related to the Internet (as “Localred,” a consortium of Catalán local administrations devoted to develop network communications and new technologies, and “Pacte Industrial de la Regió Metropolitana de Barcelona,” an association of municipalities, trade unions, private corporations and other institutions related to economic development) (see Pacte Industrial de la Regió Metropolitana de Barcelona, 2001; Martí, 2005).

Thanks to good political connections, people related to this lobby soon became part of the technical and political staff of the Barcelona Municipality: in just a few months (June 1998 to December 1999, a surprising record) a very general idea became part of Barcelona’s Master Plan and, was then assumed and approved by the municipality. In order to develop what was approved as part of the Partial Master Plan for the Poblenou area (22@bcn Plan; see Departement d’Urbanisme, 2000), a private-municipal corporation was created (called 22@bcn SA) to promote and manage all aspects related to this Plan and what was then called the 22@District (see the seminal text of Oliva, 2003). Then, BCN, the Barcelona airport code, besides being a very popular abbreviation of the city’s name, also became linked to aspects of innovation and high technology.
**22@bcn Plan: Bringing Barcelona Forward in the Information Era**

The 22@bcn Plan is the largest urban transformation in Barcelona in recent times—more than 200 hectares in an excellent central location in downtown Barcelona considered to be the strategic engine for metropolitan Barcelona’s *new economy* (see http://www.bcn.cat/22@bcn/). The transformation of Poblenou is taking place basically through urban planning instruments and private investment (except public investment in basic infrastructures). Private initiative consists of land owners, real state promoters, and banks, all of whom are trying to increase benefits from land and buildings formerly devoted to industrial uses. The goal is a profound redevelopment of the Poblenou area, attracting new activities. This shows an obvious scorn for all that used to exist in Poblenou, considering it as old, obsolete. and with no future. 22@bcn has become an issue due to the transformation of a district that maintains an important sense of identity based on its industrial past and heritage.

Following a compact, diverse and sustainable urban model, the Plan presents the opportunity to change old industrial areas (having “22a” as a code in the 1976 Master Plan) into new uses not exclusively industrial (having “22@” as a new code). This means some amount of continuity with the existing situation but also a great deal of innovation and multiplicity of land uses (housing, non-polluting industries, offices, commercial areas, hotels, etc.). The main goal is to attract “@ activities”: industries and business related to ICT as well as those related to research, design, publishing, culture, database management or multimedia activities, and they are featured by making intensive use of ICTs and they do not generate nuisance nor pollution. Coexisting with traditional neighborhood activities, these @ activities create a rich productive and diverse fabric, that facilitates the competitiveness of the business overall.

**Table 3. 22@bcn dimensions: the scale of the project [source: http://www.22barcelona.com/]**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td>Territory</td>
<td>198.26 hectares (2.0 % of Barcelona’s municipality total area)</td>
</tr>
<tr>
<td>New gross floor space</td>
<td>4,000,000 sq m</td>
</tr>
<tr>
<td>(productive activities)</td>
<td>3,200,000 sq m</td>
</tr>
<tr>
<td>(housing, facilities and services)</td>
<td>800,000 sq m</td>
</tr>
<tr>
<td>Increase in green spaces</td>
<td>114,000 sq m</td>
</tr>
<tr>
<td>Increase in facilities</td>
<td>145,000 sq m</td>
</tr>
<tr>
<td>Investment in infrastructures</td>
<td>180 million €</td>
</tr>
<tr>
<td>Increase in new jobs</td>
<td>130,000</td>
</tr>
<tr>
<td>Clusters developed</td>
<td>Media, ICT, Energy, Bio</td>
</tr>
<tr>
<td>@ activities allowed</td>
<td>“Those using individual talent as main productive resource, regardless of the economic sector they belong to: they may be related to research, design, publishing, culture, database management or multimedia activities, and they are featured by making intensive use of ICTs and they do not generate nuisance nor pollution. Coexisting with traditional neighborhood activities, these @ activities create a rich productive and diverse fabric, that facilitates the competitiveness of the business overall.”</td>
</tr>
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</table>

The Plan proposes six “Partial Master Plans” (PMP, PERI, in Catalan) to be the starting tool (representing 46% of the total area) to implement the general planning proposals: they should also mark the main lines for future urban transformation and the localization of activities, and serve as guidelines for private promoters in order to create the desired strategic dynamics in the area (García-Bragado, n.d.).
From the conception of the original project to its approval by the municipality, participation was restricted to municipal urban planners and proposals made by professionals from the digital lobby. During this period, other actors (political parties, land owners, land promoters, neighborhood associations, etc.) took part only through allegations and some limited informative meetings.

Although initially, land owners and promoters distrusted the 22@bcn Plan (as they wanted a free reconversion from industrial to residential land use), soon they realized the potential of the ICT and service sectors. In the beginning, neighborhood associations accepted the 22@bcn Plan because it helped to maintain economic activity in the district, legalized almost 5,000 illegal housing units, and promoted social housing mainly for residents.

**A Debated Plan**

The first PMPs were peripheral to the district and did not cause deep conflict, but neighborhood associations began to criticize secrecy and a non-collaborative attitudes on the part of the municipality. The huge skyscrapers proposed...
in the Llacuna PMP (December 2001) were seen as an aggression and again the low-level of participation led to popular demonstrations (almost 4,000 people). Two citizen’s associations were created at that time, both against the 22@bcn Plan: the Associació d’afectats del 22@ (neighbors negatively affected by the Plan) and Coordinadora contra el 22@ (young anti-capitalist citizens fighting against the speculative nature of the Plan, job destruction, and the links between high-tech industries and arms corporations) (see Etcetera, 2004; Maldo, 2004; Sitesize, 2004) (see Figure 2).

The conflict moved toward the municipality’s acceptance of lower skyscrapers, a vague commitment to increase social housing, some general respect to historical industrial heritage, and better communication between the municipality and its citizens. However, recent events in Poblenou (such as the citizens’ vindication of the total preservation of a 19th century factory called Can Ricart) have challenged the real applicability of these measures. The civic Platform Salvem Can Ricart (see http://www.salvemcanricart.org/) has had an important role in the inclusion of urban issues in Barcelona’s public sphere. Some members of the Platform (neighbors, architects, and academics, all working hand in hand voluntarily) have produced rigorous reports on Can Ricart (Tatjer 2005; Grup de Patrimoni Industrial del Fòrum de la Ribera del Besòs, 2006). This has been crucial for opening a high quality public debate on the urban regeneration model.

It is important to point out that the Platform has never defined itself as anti-22@. On the contrary, this social movement vindicates the 22@bcn as it was originally conceived—a plan that looked forward to the redevelopment of Poblenou without denying the district’s trajectory, while taking care of its inhabitants’ future. According to the Platform, the conflict generated around Can Ricart should not be defined as social opposition to urban transformation, but as a civic vindication of social participation and public debate (Clarós & Grup de Patrimoni Industrial del Fòrum de la Ribera del Besòs, 2005) (see Figure 3).

**Some Insights on the 22@bcn Plan and Its Evolution**

In the first stage of the 22@bcn Plan (from 1995 to 1999), the basic lines of urban intervention in Poblenou were drawn: maintenance of industrial activity, recognition of existing illegal housing, proposals for diversity, and compactness of land uses. Corporative links between municipal...
technical staff and professional lobbies without public participation prevailed. Municipal policy toward Poblenou was characterized by instability and hesitation, especially because it still was not seen as a priority.

In a second phase (1999 onward), the ideas impelled by the digital lobby prevailed thanks to the development of a specific conceptual framework regarding the future of Poblenou. This framework was influenced by, among other factors, the economic ideas of Manuel Castells, by theories on regional development, and by experiences of other cities on innovative milieu and technological parks (Castells, 1996).

At that precise moment, the .com companies (based on the uses, contents and applications of Internet and ICT) seemed to offer unlimited potential, even more so than the consumer solutions (only based on the specialization of the city as a tourist attraction). Compared to the apparently simple development brought by tourism, a presumed digital city (the supposed excellent potential of Barcelona for economic activities based on the intensive use of knowledge, and ICT design, creativeness, research) appeared to be a firm proposal to increase economic dynamism in the city and metropolitan region, creating new and highly qualified jobs, and helping to build a more complex and sustainable city.

The digital lobby exerts a real strategic power over future options for the district and its economic changes, projecting a wishful but necessary future for the city. In fact, the proposed ideas are not new at all, as they repeat the typical options of international urban entrepreneurialism that have existed since the mid 1980s in many other cities with projects related to ICT.

The strategic vision of the digital lobby became strategic power when political connections were brought into play. In 1999 the municipality urgently needed new and original ideas and some members of the lobby became councilors or began to work directly with decision makers, facilitating the approval and implementation of the Plan. Consequently, the success of the 22@bcn Plan sheds light on the power exerted by professionals from the public and private sectors. Together with land owners and promoters, they emerge as the groups that have an enormous capacity to influence the decisions and the governance of the city. The knowledge that those professionals, governmental employees and non-elected local agencies have, together with their privileged economic position, becomes a key resource that makes it possible for different groups to accede to the decision processes.

The structural power of the real estate sector and its increasing interest in obtaining the greatest possible economic benefits requires continuous regulation and strong political leadership; looking back on the process, this political leadership from the municipality has shown great weakness and lack of control over these tendencies. Private initiative is mainly devoted to filling the district with new hotels, banal office buildings, and lofts, taking advantage of the possibility to increase built-upon surface area (in principle granted only for 22@ activities) with little consideration for the social, productive, and architectural heritage of Poblenou.

Although 22@bcn initially generated enormous consensus, the Plan was basically devoted to economic promotion and development, with a metropolitan overview of the reality, and its goals were based primarily on land availability in a privileged location in the center of the city. This is why social, cultural, and heritage policies, together with links with citizen’s goals and interests, were not well-defined. The urgent need of the 22@Office for investments and clear results from the 22@bcn Plan, and the lack of clear political directives, has undeniably pushed to consolidate this tendency to grant privileges to private and economic interests.
CONCLUDING REMARKS AND FUTURE DIRECTIONS

Barcelona’s urban development has gone through various stages. In the first (which culminated with the 1992 Olympic Games), the city was re-conceived by developing an urban planning policy based on two pillars: urban transformation and the production of images. The language of culture and the role of public spaces shifted into urban planning strategies that morphologically changed the city and created images capable of uniting the citizenry. This urban planning policy itself, elevated to the level of model, became the very image of the city.

In the second stage, the pillars of the urban planning policy remained the same, but the requirements for private initiative were much greater and more evident. From the emphasis on public spaces, community facilities, and collective infrastructures, primacy shifted to private spaces, unique buildings, and individual interests, thus arose the paradox that the *Barcelona experience* from the Olympic period, supposedly a model, was not fulfilled in the city where it was created. Once the aftereffects of the Olympic period had subsided, an apparent bid for a *city of knowledge* arose, which, in fact, was simply a functional image that is now used in order to foster the discourse of a city of knowledge and innovation, expelling old industrial activities to the metropolitan peripheries and, then, allowing the introduction of new speculative activities based on a supposed prosperous *new economy*.

The 22@bcn Plan has given the opportunity to introduce public debate on urban development. Neighborhood associations have assumed a central role connecting ideas coming from the Plan with the social reality of the district. A significant part of neighborhood and social movement are the groups that more strategically support the 22@bcn Plan by bringing new and fresh ideas, simultaneously exerting these as a mechanism of control. Their power lies in their capability for mobilization and their ability to create alliances between non-organic professionals and intellectuals, creating the possibility to exert another kind of strategic power. The campaign to preserve historical heritage in Poblenou is very significant, and runs in parallel to the vindication of economic innovation and cultural diversity. Nevertheless, social claims in Barcelona do not have as much public visibility as private initiative (Zusman, 2004).

There are two paradoxes stemming from the economic transformation of Barcelona. The first one is that although the service sector (and particularly the tourism sector) and the real state sector (particularly, construction) are the economic activities that have experimented major growth in terms of employment, the local authorities are investing all their efforts on recognizing the “@ sector” as fundamental for Barcelona’s future. A great deal of the urban strategy is oriented toward the consolidation of Barcelona as a city of knowledge. However, the local working class does not fit in with the expectations of local entrepreneurs.

According to several reports, though, Barcelona is far from reaching the necessary conditions for transcending the industrial era today. As many local analysts have stated, it is not industrial activity that is in decline, but the type of economic structures and sectors related to the Fordist system of production and the specific patterns of localization of industrial activities. Factories are moving from the central city to the metropolitan peripheries (Balibrea, 2001; Ferrer & Nel-lo, 1990; Trullén, 1998, 2001, n.d.). According to these analyses, the city cannot obviate its current labor market conditions. As Joan Trullén has stated, Barcelona needs to “fight against the growing polarization and disarrangement between offer and demand in the metropolitan labor market” (Trullén, 1998, p. 17).

A second important paradox is that although Barcelona, Catalonia, and Spain are relying on the new economy as the magic key for entering the Information Era, the country does not occupy a
privileged position on the list of developed countries in terms of knowledge production and ICT industrial implementation. Cyber-illiteracy is still quite generalized, and formation is more devoted to business requirements of the new economy than to social needs coming from the challenges of the new social and demographic profile of the city. The new online participation only permits an individualized interaction (information inquiries, bureaucratic procedures, etc.). Therefore, the city of knowledge strategy needs to implement a real “network mentality” (Castells & Ollé, 2004). The gap between access to technology and access to knowledge grows hand-in-hand with the gap between basic facilities and cultural, formative and labor conditions.

In fact, the emergence of new sectors and actors has raised new challenges. The first one is to apply policies to promote interconnectivity between different fields of action, thus leading to better administrative and management organization. The second challenge is that public initiative must not lose the protagonism it achieved during the period of the Barcelona model. The City Council must maintain its key role as the primary city promoter.

All of these questions indicate to us that local government in Barcelona needs to improve the balance between long-term projects and short-term profits. In Barcelona, there is a clear imbalance between the strategic projection of the city of knowledge, and the execution of this project through urban planning. The comprehensive conception of the city as a whole, which characterized the Barcelona model, is now under question.

Perhaps the 22@bcn Plan should be seen as a great exception to this situation and an excellent example of a good practice of urban policy implementation, combining urban planning (urban physical transformation) and urban discourse (the need for a city of knowledge). The ideas proposed in the 22@bcn Plan are not innovative, even on a local level. What is really new and important is that those ideas are formulated in a broader context (Barcelona in the economy and the society of knowledge and information); there is a real possibility to implement them, and they are presented under a new and exclusive brand—“22@.” On a conceptual level, this is essential because the existence of a label (that recalls the passage from the industrial 22a to the informational 22@), allows for the development of effective marketing of the idea and the project (both internally in Barcelona and abroad) and creates a powerful coalition between professionals, technicians, land promoters, neighborhood associations, councilors of the municipality, and so forth. In addition, the strict guidelines of the Master Plan should bring some sense of security and certainty regarding the good will and public leadership of the project and the need for social consensus (between all involved agents) in every change proposed for the 22@ district.

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Chapter IX
Towards Ubiquitous City:
Concept, Planning, and Experiences
in the Republic of Korea

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ABSTRACT

The rapid development of information and communication technologies had a significant effect on contemporary urban and regional planning. Ever since Mitchell (1999) envisaged a vision of “E-topia,” a development of robust delivery system for the digital network into knowledge-based urban development has been rigorously challenged. Information and communication technologies are evolving cities from virtual city, which reproduces urban elements inside the virtual computer world, to ubiquitous cities, where the ubiquitous computing amongst urban elements, such as people, buildings, infrastructure, and urban space is available. Nevertheless, a strategic ubiquitous city planning is yet to be addressed in an integrated manner by planners and regional analysts because the technologies and applications still need to be fully developed. The Republic of Korea has recently had some experience in developing the ubiquitous city concept and planning principals as a means of knowledge-based urban development. This chapter introduces key ubiquitous technologies, and discusses implications of the ubiquitous city concept into planning and design schemes for knowledge-based urban development in the Republic of Korea.
INTRODUCTION

Information and communication technologies (ICTs) had occupied their position on knowledge management and are now evolving toward the era of self-intelligence (Klosterman, 2001). In the 21st century, ICTs for urban development and planning are imperative to improve the quality of life and place. This includes the management of traffic, waste, electricity, sewerage, and water quality, monitoring fire and crime, conserving renewable resources, and coordinating urban policies and programs for urban planners, civil engineers, and government officers and administrators.

The handling of tasks in the field of urban management often requires complex, interdisciplinary knowledge, as well as profound technical information. Most of the information has been compiled during the last few years in the form of manuals, reports, databases, and programs. However, frequently, the existence of these information and services are either not known or they are not readily available to the people who need them. To provide urban administrators and the public with comprehensive information and services, various ICTs are being developed.

In early 1990s, Mark Weiser (1993) proposed the Ubiquitous Computing project at the Xerox Palo Alto Research Centre in the U.S. He provides a vision of a built environment in which digital networks link individual residents not only to other people, but also to goods and services whenever and wherever they need (Mitchell, 1999). Since then, the Republic of Korea (ROK) has been continuously developing national strategies for knowledge-based urban development (KBUD) through the agenda of Cyber Korea, E-Korea, and U-Korea.

Among above-mentioned agendas, particularly the U-Korea agenda, aims the convergence of ICTs and urban space for a prosperous urban and economic development. U-Korea strategies create a series of U-cities based on ubiquitous computing and ICTs by a means of providing ubiquitous city (U-city) infrastructure and services in urban space. The goal of U-city development is not only boosting the national economy but also creating value in knowledge-based communities. It provides opportunity for both the central and local governments to collaborate with the U-city project, to optimize information utilization and to minimize regional disparities. This chapter introduces the Korean-led U-city concept, planning, design schemes and management policies, and discusses the implications of U-city concept in planning for KBUD.

BACKGROUND: CONCEPTS AND KEY ISSUES

The U-City Concept

The aim of U-city is to create a built environment where any citizen can get any services, anywhere, and anytime through any ICT devices. Tremendous speeding in ICT development has brought the conventional city in terms of intelligence, innovation, and evolution to E-city and then to U-city.

The intelligent services, such as home banking, telecommuting, teleconferencing, telemedicine, intelligent transportation system (ITS), remote sensing, monitoring, and control of urban infrastructure are always available in U-city. It is crucial to provide high speed, convenient, and accessible information and services anytime and anywhere. U-city concept also helps realize U-democracy to encourage citizens to participate in policy decision-making, negotiation and voting. This aims to make citizens live in comfortable, convenient, secure, and healthy environments using ubiquitous technologies.

U-city refers to the environmentally friendly and sustainable smart (or knowledge) city, which makes the ubiquitous computing available amongst the urban elements, such as people, building, infrastructure, and open space. The U-city is
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Quite different from the well-known virtual city. While the virtual city that reproduces those urban elements visualized within the virtual space, U-city is created by the computer chips or sensors inserted to those urban elements. It is a basic unit of U-city that the sensors and sensor networks continually communicate with wired or wireless computer devices embedded in people, buildings, infrastructures, and any feature of urban space. This allows ubiquitously communicating person to person, person to object, and object to objects where computers or devices are invisible to users. Effectiveness in urban planning and management can be improved by using real time data acquisition and information monitoring via those embedded computers in every part of the cities (Figure 1).

Technologies of U-Cities

A range of implications of ICT have been adopted in the various areas of U-city such as social science, geography, planning, and architecture. In particular, such possibilities have been assessed, which include introduction of e-governance (Pratchett, 1999; Yigitcanlar, 2003), implications of e-commerce (Evans, 2002), investment in transportation infrastructure (Mikelbank, 2004), and telecommunication and city planning (Graham, 1999). Studies in the same genre also take either the application of ICT as a tool of public policy measures or the development of ICT policy to urban planning (Cohen & Nijkamp, 2002; Cohen-Blankshtain et al., 2004). These implications also can be applied to U-city, but it became only possible by a means of high-capacity digital networks to enable the delivery of a large volume of information whenever and wherever people need it. In other words, U-city can be differentiated by the types and levels of ICTs. The 13 key technologies used in U-city include:

- **Broadband convergence network (BeN):** The integrated next generation wired/wireless network for the convergence of voice, data, internet, telecommunications, and broadcasting. BeN is expected to provide the backbone for ubiquitous computing services, and is designed to provide Internet access at speeds of 50Mbps to 100Mbps, about 50 times faster than current conventional services, with nationwide coverage.

- **High speed downlink packet access (HS-DPA) and wireless broadband (WiBro):** The wireless Internet technologies, which enable users to enjoy contents usually seen

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Figure 1. Difference between virtual city and U-city (Lee, 2005b; & Weiser, 1993a)
on a PC and on their cellular phone as well. The feature of HSDPA and WiBro is a screen telephone service that supports video conferencing with a mobile device. HSDPA and WiBro can transmit fast, easily, and reasonably high-quality large-size multimedia, such as moving images and MP3 files.

**Ubiquitous sensor network (USN):** The ubiquitous environment for communication among the small embedded devices with sensing capabilities. Small enough to guarantee the pervasiveness in U-city, sensor devices associate creating networks that provide valuable information to be exploited for a great variety of sensor applications. USN should be numerous, casually accessible; often invisible computing devices; frequently mobile or embedded in the environment; connected to an increasingly ubiquitous network infrastructure; and composed of a wired core and wireless edges to get information through any devices anytime, anywhere.

**Fiber to the premise (FTTP):** A form of fiber-optic communication delivery in which an optical fiber is run directly onto the customers’ premises. Fiber to the premises can be further categorized according to where the optical fiber ends. **Fiber to the home (FTTH)** is a form of fiber optic communication delivery in which the optical signal reaches the end user’s living or office space at the speed of 100Mbps to 1Gbps. **Fiber to the building (FTTB)** (also called Fiber to the Basement) is a form of fiber optic communication delivery in which the optical signal reaches the premises but stops short of the end user’s living or office space (http://en.wikipedia.org/wiki/Fiber_to_the_premises, U-city Law, 2007).

**Radio frequency identification (RFID):** Sensing technology to automatically identify animal, people, or objects using radio waves from small sensor devices, which are composed of RFID tags or transponders, and RFID readers. All RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio frequency (RF) signal, and perhaps other specialized functions. The second is an antenna for receiving and transmitting the signal (http://en.wikipedia.org/wiki/RFID). The RFID tags can automatically be read from 1.8 meter to 27 meters away.

**Internet protocol (IPv6):** A network layer protocol for packet-switched Internet-works. It is designated as the successor of IPv4, the current version of the Internet Protocol, for general use on the Internet. The main improvement brought by IPv6 is the increase in the number of addresses available for networked devices. IPv4 supports 232 (about 4.3 billion) addresses, which is inadequate for giving even one address to every living person, let alone supporting embedded and portable devices. IPv6, however, supports 2128 (about 340 billion) addresses, or approximately 5×1028 addresses for each of the roughly 6.5 billion living people today (http://en.wikipedia.org/wiki/IPv6).

**Context awareness computing technology:** Used to acquire and utilize information about the context of a device to provide services that are appropriate to the particular people, place, time, events, and so on. For example, a cellular phone will always vibrate and never beep in a concert, if the system can know the location of the cellular phone and the concert schedule (Moran & Dourish, 2001).

**Augmented reality (AR):** A field of computer research that deals with the combination of real world and computer-generated data. At present, most AR research is concerned with the use of live video imagery that is digitally processed and augmented by the addition
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of computer-generated graphics. Advanced research includes the use of motion-tracking data, fiducial marker recognition using machine vision, and the construction of controlled environments containing any number of sensors and actuators (http://en.wikipedia.org/wiki/Augmented_reality).

- **System-on-a-chip (SoC):** An idea of integrating all components of a computer or other electronic system into a single integrated circuit. It may contain digital, analog, mixed-signal, and often radio-frequency functions all on one chip. A typical application is in the area of embedded systems.

- **Geographic information system (GIS):** A computer system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically referenced information. In a more generic sense, GIS is a tool that allows users to create interactive queries (use-created searches), analyze the spatial information, edit data, maps, and present the results of all these operations. GIS technology can be used for scientific investigations, resource management, asset management, environmental impact assessment, urban planning, cartography, criminology, history, sales, marketing, and route planning. For example, a GIS might allow emergency planners to easily calculate emergency response times in the event of a natural disaster, a GIS might be used to find wetlands that need protection from pollution, or a GIS can be used by a company to find new potential customers similar to the ones they already have.

- **Global positioning system (GPS):** Currently the only fully functional Global Navigation Satellite System (GNSS), developed by the U.S. Department of Defense. Utilizing a constellation of at least 24-medium Earth orbit satellites that transmit precise radio signals, the system enables a GPS receiver to determine its location, speed, and direction. GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, and scientific uses. GPS also provides a precise time reference used in many applications including scientific study of earthquakes and synchronization of telecommunications networks.

- **Telematics:** The science of sending, receiving, and storing information via telecommunications devices. More commonly, telematics have been applied specifically to the use of GPS technology integrated with computers and mobile communications technology. Transport telematics applications are contributing to safer, cleaner, and more efficient transport by helping travelers, freight distributors, and transport operators avoid delays, congestion, and unnecessary trips; diverting traffic from overcrowded roads to alternative modes including rail, sea and inland waterways; reducing accidents; increasing productivity; gaining extra capacity from existing infrastructure; encouraging integrated transport reducing energy use; and reducing environmental pollution. It could provide potential savings of time and energy for individual drivers, reduction of congestion for the city, and impact on long-term land use.

- **Middleware in simulation technology:** A computer software that connects software components or applications. It is used most often to support complex, distributed applications. It includes web servers, application servers, content management systems, and similar tools that support application development and delivery. In Simulation, middleware is a term generally used in the context of the high level architecture (HLA) that applies to many distributed simulations. It is a layer of software that lies between the application code and the runtime infrastructure (RTI), hence middle in
its title. Middleware generally consists of a library of functions and enables a number of applications (simulations or federates in HLA terminology) to page these functions from the common library rather than recreate them for each application.

These ubiquitous technologies are vital to achieve the goal of U-city and to provide a range of urban services. The following section demonstrates how these ubiquitous technologies could be used for to improve the quality of urban services.

**Services of U-cities**

The ubiquitous in U-city provides services for people so they can enjoy access to high-speed networks and advanced communication services ranging from U-life to U-business and U-play to U-government. U-city services begin with the digitalization of the activities in family life, business, economy, and public administration. This large volume of digital data is processed and utilized in the speeding of the process. The Smart city that includes smart home, smart transport, smart Medicare, and smart education is an integral part of U-city services. Table 1 provides a summary of the U-city services and its possible effectiveness. A range of new U-city services would be provided for the various situations and needs of cities and their citizens. Some of these services are listed and explained below:

- **U-life**: By benefiting from U-life citizens may access services like home networking, which links, monitors, and controls household appliances. They can do the remote meter reading and inspection, home banking, and shopping. Citizens can check their roof-garden environment by using Zigbee-based sustainable ecosystem, which consists of swarms of sensors for climate, environmental physical measures, soil humidity, and the like (Pietsch, 2006). U-healthcare and U-education will provide a range of additional services at home. Telematics, a coined term derived from telecommunication and informatics, refers to services that comprehensively provide traffic information, e-mail, Internet access, and multimedia entertainment as well as emergency rescue information to automobile drivers on a real-time basis (Lee, 2005; Lee & Leem, 2006).

- **U-business**: Firms can get benefit and save the cost through U-business services, which include U-office, Multimedia conferencing, information management, and virtual market. At U-office, businessmen can go online for conferencing with the enterprises in distant regions or foreign countries (Lee, 2005; Lee & Leem, 2006). They can send pictures and documents to their guests through messenger by WiBro terminal. Firms also can purchase best deal materials from the virtual market.

- **U-government**: Many types of pollutants could be removed with the help of sensors that detect pollution in the air, soil, and water. Surveillance cameras ensure the safety of people at parks or other public areas. Ubiquitous instruments smoothly run the city’s transportation system by accurately forecasting arrival and departure times of buses or trains, and to minimize traffic congestion (Lee, 2005; Lee & Leem, 2006). Location-based services are being used to provide protection for the mentally handicapped and walking guide services for the blind. Ubiquitous sensor networks are to be placed at school zones to protect children. U-agriculture is to be used on livestock, where sensors on the livestock could detect avian influenza before its spread and massive destruction.
• **Location-based services (LBS):** LBS are offered by cellular phone networks as a way to send custom advertising and other information to cell-phone subscribers based on their current location. The cell-phone service provider gets the location from a GPS chip built into the phone, or using radiolocation and trilateration based on the signal-strength of the closest cell-phone towers. One example of LBS might be to allow the subscriber to find the nearest business of a certain type, such as a Turkish restaurant. The ability of the restaurant to send an invitation to bypassers, even though this might be regarded

### Table 1. Example ubiquitous city services (Lee & Leem, 2006)

<table>
<thead>
<tr>
<th>Service Area</th>
<th>System</th>
<th>Effectiveness</th>
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<tbody>
<tr>
<td><strong>U-life Services</strong></td>
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<td></td>
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<tr>
<td>Culture and Lifestyle</td>
<td>- U-home</td>
<td>• High quality of life</td>
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<td></td>
<td>- U-library</td>
<td>• Diversified cultural amenities</td>
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<td></td>
<td>- U-museum</td>
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<tr>
<td>Education</td>
<td>- U-learning</td>
<td>• Minimizing private education cost</td>
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<td></td>
<td>- U-education</td>
<td>• Providing life education opportunity</td>
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<td></td>
<td>- U-campus</td>
<td>• Creative and self-learning education</td>
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<tr>
<td>Environment</td>
<td>- U-waste management</td>
<td>• Alleviating environmental degradation</td>
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<tr>
<td></td>
<td></td>
<td>• Better living amenity</td>
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<tr>
<td>Health and Welfare</td>
<td>- U-health</td>
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<td></td>
<td>- U-remote health examination</td>
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<td>- Aging care system</td>
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<td></td>
<td>- Smart home</td>
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<tr>
<td>Business</td>
<td>- U-business</td>
<td>• Dietary requirement</td>
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<td></td>
<td>- U-commerce</td>
<td>• Regular exercise</td>
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<td></td>
<td>- U-management</td>
<td>• Healthcare for aging society</td>
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<td>Finance</td>
<td>- U-payroll</td>
<td>• Remote control and treatment</td>
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<td></td>
<td>- U-banking</td>
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<td></td>
<td>- Intelligent payment system</td>
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<tr>
<td>Employment</td>
<td>- U-job data search system</td>
<td>• Transparency in banking and finance</td>
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<tr>
<td><strong>U-business Services</strong></td>
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<tr>
<td>Transport</td>
<td>- U-logistics, U-trading</td>
<td>• Reduce trading cost</td>
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<td></td>
<td>- Smart shipping</td>
<td>• Effective stock management</td>
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<td></td>
<td>- Intelligent traffic system</td>
<td>• Prevent traffic accident</td>
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<td></td>
<td>- Smart vehicle</td>
<td>• Incentive to automobile industry</td>
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<td></td>
<td>- Intelligent road</td>
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<tr>
<td>Construction/ SOC</td>
<td>- Smart building</td>
<td>• Central climate control</td>
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<td></td>
<td>- U-office</td>
<td>• Damage control in fire and accidents</td>
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<td></td>
<td>- U-apartment</td>
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<tr>
<td>Agriculture and Food</td>
<td>- Food line tracking system</td>
<td>• Health and safety</td>
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<td></td>
<td>- Livestock recode keeping</td>
<td>• Improve livestock management</td>
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<td>• Livestock disease control</td>
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<tr>
<td><strong>U-government Services</strong></td>
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<tr>
<td>Administration</td>
<td>- U-government</td>
<td>• Improvement of the quality of public services</td>
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<td>• Customer oriented</td>
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<td>• 24/7 service</td>
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<tr>
<td>Emergency</td>
<td>- Emergency control by GIS, GPS</td>
<td>• Centralized control in national emergency</td>
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<td></td>
<td>and RFID</td>
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<tr>
<td>Security</td>
<td>- U-defense</td>
<td>• Increasing military force</td>
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<tr>
<td></td>
<td>- U-police, Mobile investigation</td>
<td>• Deceasing military cost</td>
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<td>with crime data</td>
<td>• Minimizing red-tapes</td>
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<td></td>
<td>- Prisoner management</td>
<td>• Online access to criminal data</td>
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as unsolicited commercial e-mail or spamming. This can be especially useful when dialing an emergency telephone number (119 in Korea, 911 in North America, 112 in Europe, or 000 in Australia) so that the operator can dispatch emergency services, such as emergency medical services, police or fire-fighters to the correct location.

- **Intelligent transportation systems (ITS):** ITS play particularly vital roles in ensuring mobility for all and enabling business to meet orders in increasingly competitive markets. It could provide potential savings of time and energy for manufacturers and individual drivers, reduction of congestion for the city, and impact on long-term sustainable land use.

- **Smart and intelligent building:** Most intelligent buildings sense or manage several variables, or manage more than one building system, extracting greater performance than several disconnected building systems could achieve. Some form of network, or integrated information system seems to be required for a building to be called intelligent.

- **Teleport and intelligent building:** In a seaport, ships bring in and take away raw material and manufacturing goods. Similar to a seaport in a teleport, it is electronic information that comes into the port; it is modified in some way and then sent on to another destination. The principal components of the teleport would include a central facility offering diverse telecommunications across a variety of mediums, a land development opportunity, and a distribution network to link telecommunications users in the area. It could potentially provide ICT services efficiently to the users.

### PLANNING STRATEGIES OF U-CITIES

Urban planners ultimately focus on developing ubiquitous computing environments so people,
objects, buildings, urban infrastructures, and places in cities could simultaneously communicate with each other. This communication helps in accessing crucial information and also improves the quality of life. The major objectives of a U-city planning comprises: forecasting futuristic society; inducing U-city services to meet society and citizens’ needs; building the physical mobile/built infrastructure and environment for ubiquitous computing; planning the U-city spatial structure and land use; and managing the U-city and its planning process (Figure 2).

**Forecasting Futuristic Society and Extracting U-City Services**

It is important to adequately foresee the image of a city and the characteristics of its society so that planners may target U-city services that citizens would need. Because the goal of creating U-city varies by the urban problems and visions that cities face, it is very important for cities to select the kind of U-city services to be introduced, considering its budget, technological availability, and citizens’ needs. Figure 3 illustrates several key services of a U-city.

**Constructing U-City Infrastructure and Environment**

How to converge ICTs and physical urban environment is an important planning question of a U-city. Mobile ubiquitous computing environment (MUCE), such as wearable computers or cellular phones, as well as built ubiquitous computing environment (BUCE), including embedded urban infrastructure and place, are planned in U-city (Figure 4). Previous technology stakeholders proceeded to develop MUCE without considering the physical urban planning; it was not as successful as it was hoped to be. Therefore, BUCE is a current hot agenda for U-city in ROK.

Narrowly the BUCE plan focuses on developing the U-city convergence technologies between ICTs and urban infrastructures. More broadly, U-city urban structure making and urban land use planning should be considered in the process of constructing BUCE as a U-city environment, with planning and designing the digital wall as an urban screen, the ubiquitous digital street, and the ubiquitous open space/park. Innovative changes in urban form and land use pattern should be considered with the BUCE planning and design.
Designing Compact and Decentralized Concentration as U-City Spatial Structure

Compact and decentralized urban form is an ideal urban structure for a U-city. It has clear urban districts, distinct neighborhoods, and open space like farms and woodland, which coupled with the trends of environmentally sound and sustainable development (ESSD). The concepts of compactness and concentration originates from ubiquitous computing, while the term of decentralized comes from the concept of ubiquitous computing and ESSD, which make the cities achieve a strong agglomeration economy, self-sustainability, and amenity without proximity to each other. Also the concept of U-city accessibility changes from distance only to the time and telecommunication quality. The central places theory determining the number, size and distribution of towns by distance is no longer valid, and U-city at the same time accelerates both compact and decentralized concentrations of places. The three or four urban hierarchical systems, such as central business district, districts, neighborhood, and local are likely to be substituted for one or two

Figure 4. Mobile/built ubiquitous computing environment

Figure 5. Decentralized concentration urban form (Derived from Congress for the New Urbanism, 1999; Urban Task Force, 1999)
urban hierarchical systems, or horizontal network systems that have poly-centric cities. The compact and well-connected decentralized concentration networked U-city is expected to diminish urban sprawl, car use, land demand, and open space loss, which constitutes the major problems of contemporary cities.

**Mixed Land Use and Programmable Land Use Planning**

U-city services provide an ease for residents to spend majority of their free time in relaxing, working, and enjoying entertainment at home instead of going out for conventionally dealing with these services. The main attractions of city living is proximity to work, shops, and basic social, educational, and leisure amenities. In this context, mixed land uses in the same neighborhood, street, urban block, or even a building, are essential for U-cities. Increased mixed land uses of a U-city decreases the trip distance, energy consumption, and land requirement, unlike a conventional city.

U-city technologies create programmable spaces that are built as flexible and modular spaces that could be changed into various uses when needed. For instance, the wall of a building can be converted into a digital advertising wall, or a digital masterpiece-pictured wall via ubiquitous media technologies. Finally, programmable land use planning would make use of land and building effectively to satisfy the new demand of them without additional supply. Therefore, increased possibilities of the mixed land use and the programmable space causes the decrease in trip distance, and energy, and land consumption.

**U-City Management Planning**

With the construction of MUCE and BUCE, U-city management planning needs to be seriously taken into account. U-city management is the U-city software system to control U-city hardware infrastructures, MUCE, and BUCE. It could be implemented through the virtual space, such as a monitoring system, experiment system, and U-city management centre. A monitoring system encourages citizens to be secure and convenient. U-city could solve the urban problems via experiment system through public participation. U-city control centre is a facility that collects, analyses, distributes, integrates, and controls data from U-city through the ubiquitous sensor network for carrying the U-city management effectively.

**New Planning Method for Data, Democracy, Market-Oriented Urban Planning and Management**

Urban planning and management of U-cities focuses on physical, socio-cultural, economic, and technological aspects of the city and society (Lee, 1999). The market-oriented urban development of U-cities is realized by designing new U-city planning and management methods, which are experimental urban planning (EUP) methods mainly based on KBUD principles (Yigitcanlar, 2007) and a combination of both qualitative and quantitative methods.

EUP is the method that draws social agreement between the public officials who establish and practice urban planning and the stakeholders and interested parties concerning a certain project through the experiment on the virtual space with the help of U-city technologies. Real Estate Bond Exchange (REBE) system (Lee, 2001), Real Estate Bond Exchange between Group (REBE-G) system (Lee, 2002), and Policy Experiment simulation system, PESS (Lee, 2004) are among the EUP examples, which are the interactive, iterative, and web-based cyber housing market implementations for the U-city planning and management system.
ROK has continuously developed national strategies for KBUD through different stages of Cyber Korea, E-Korea, and U-Korea. Most of the people were able to own and use a personal computer in Cyber Korea in the late 1990s, and, with the rapid ICTs, E-Korea aimed to make Internet use widespread and to build a high-speed Internet network and virtual city as an urban information system. Another emphasis for Cyber Korea and E-Korea was on providing training for everyone to ensure the necessary ICTs skills and capabilities. Subsequently, U-Korea focused on the integration of ICTs and physical city to aim at the convergence of virtual city and real city. Wired ICTs were used in Cyber Korea and E-Korea strategies, but wireless ICTs added to the U-Korea strategy for building urban infrastructure. U-Korea is thriving to make convergence of ICTs and knowledge urban space rather than to develop ICT itself in Cyber Korea and E-Korea. Figure 6 illustrates the evolution of ICT development with the national information and technology strategies.

Under the latest U-Korea strategy, the Korean government is trying to build a U-city by integrating KBUD. The U-city development project is an integral part of the national strategy toward U-Korea. As a national urban development project, U-city emphasizes KBUD by strengthening the role of ICTs in urban planning and management. ICT itself has a limit to make a large value addition, but U-city, as a planning package of ICTs and KBUD, has a significant effect on the ICT and building industries, such as building construction, telecommunication services, infrastructure planning, ICT education, ICT equipments, software, and contents. These activities could boost the regional economy and create value in KBUD. Therefore, the Korean government supports U-city as a model city that integrates ICTs and KBUD.

The central government in ROK has directly involved in the planning of U-city in order to maximize information utilities and to minimize a level of regional disparities. A decentralized, de-concentration policy has been adopted where

Figure 6. Korean strategies for the information and KBUD (Ha, 2003)
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A growth pole strategy (GPS) is needed. The selected departments of the central government have been relocated to local areas, and key public institutions in the Seoul Metropolitan Area are moved to outer regions. Inline with GPS, KBUD is proposed with a regional innovation development strategy (RIDS). This strategy has been adopted in order to transform developing areas to knowledge-based urban clusters by building regional innovation systems for knowledge-based industries. This innovation system induces the revitalization of underdeveloped regions.

The Korean government has played a significant role in making various policies for U-city as a case of KBUD to create a knowledge spill-over effect. For instance, the Ministry of Information and Communication (MIC) prepared an IT839 strategy including eight new services, three key network infrastructures, and nine promising engines for regional knowledge growth. Local authorities have been laying out comprehensive U-city plans for solving existing urban problems and strengthening their knowledge-based industries and services. For instance, Seoul metropolitan city has been pushing Sangam Digital Media City project to make a research and development hub for the high-tech knowledge industry since 1998 (Townsend, 2005). More recently, the city of Seoul has applied a U-tour portal system that provides information on restaurants, retails, accommodations, and the hot spots in the city, to attract 12 million or more tourists to Seoul by 2010. Visitors will be able to get access to the services by using their cellular phones.

Incheon city also plans to introduce an intelligent transportation system, home networking, tele-medicine, disaster prevention/monitoring and pollution controlling system by 2020. Providing an advanced ubiquitous computing environment is a part of Inchon’s U-city plans, New Songdo U-City as a Y-generation city scheduled for completion in 2014. New Songdo will locate the U-city control centre and provide U-services to the citizens, which includes TOPAZ for on-call taxis and emergency/rescue services for patients, MelON mobile music portal service, GXG three-dimensional mobile game, Cyworld online social network, Moneta mobile credit-card service, and satellite digital multimedia broadcasting.

The Busan city government also has U-city plans to upgrade Busan into an innovative city by 2010 providing ubiquitous environment around the port area. The plan focuses on providing convention/exhibition centers and integrated transportation services. On the other hand, Daejeon city is keen to build the fastest network infrastructures and digital wall for broadcasting commercial advertisements. When it is completed, the residents in Daejeon city will get an electronic identification to access various ubiquitous services. While Busan and Daejeon city pay a particular attention to establishing U-city infrastructure, Jeju city focuses on tourism development using the U-services including u-traffic, u-museum, u-park, and u-coupon services. U-traffic based on RFID technologies allows residents or tourists to access traffic information anytime and anywhere. U-museum will be built at the Jeju stones and cultural park in Northern Jeju. The ubiquitous technologies used in the museum include an anti-theft system, which traces visitors’ moves and whereabouts within the museum, and a u-coupon system, which electronically collects admission fees.

There are many other urban planning and development schemes used in various towns, cities, and regions in ROK. Ubiquitous computing is a powerful planning tool as it is very flexible for planning strategies and objectives. It is an interesting phenomenon that ICTs significantly impact on the typology of Korean cities and towns. Like other knowledge-based and environmentally friendly developments in the developed countries, the urban planning in ROK relies on ICTs to overcome the unprecedented urban management problems and to enhance the quality of life. The typology of Korean cities and regions based on the ICT application can be summarized as: a knowledge-
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Based industrial complex with embedded software technologies in North Gyeongsang Province; a research and knowledge hub in Chungcheong Province; a manufacturing hub for optical fiber communications in South Jeolla Province; an industrial park for computer network-based logistics in South Gyeongsang Province; and finally, Gangwon Province developed as the heart of the Korea’s biotechnology industry.

These developments are often accompanied by the U-city project. Public and private partnerships are a key to deliver what the city proposed. In particular, KBUD is proposed by the Korea National Housing Corporation (KNHC) and the Korea Telecom (KT), the nation’s largest Internet access provider. A futuristic knowledge-based U-city, Unjeong city, is under development in the northwest of Seoul. Unjeong is based on KBUD and will accommodate 46,256 households for the population of 124,898 in the area of 939 hectare from 2003 to 2009. In order to achieve the goals of KBUD, Unjeong city is planning to

Table 2. ICTs used in the U-city of Unjung (Yim, 2006)

<table>
<thead>
<tr>
<th>Area</th>
<th>Wired</th>
<th>Wireless</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td></td>
<td></td>
<td>IBS (Intelligent Building System)</td>
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<td></td>
<td></td>
<td></td>
<td>- IntraNet, building automation, office automation, security</td>
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<td></td>
<td></td>
<td></td>
<td>- Home office, remote A/V conferences, mobile work</td>
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<tr>
<td>Residence (Public Housings)</td>
<td></td>
<td></td>
<td>- Home-network services: remote controlling, remote inspection, security/</td>
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<td></td>
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<td></td>
<td>rescue systems, digital TVs, car entry, home offices (optional), elderly care (optional);</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Latest-technology community facilities (remote inspection, multimedia rooms)</td>
</tr>
<tr>
<td>Commerce</td>
<td></td>
<td></td>
<td>e-commerce, RFID-inventory management</td>
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<tr>
<td>Knowledge Facilities</td>
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<tr>
<td>Museum/Gallery</td>
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<td>High-tech information system (using Avatars, etc.), virtual 3D exhibitions,</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>U-Experience Hall, U-Game Hall, remote visit systems</td>
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<tr>
<td>Library</td>
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<td></td>
<td>Multimedia data, digital library</td>
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<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td>Remote diagnosis/treatment system, e-prescriptions, patient information sharing, customized treatment</td>
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<tr>
<td>School</td>
<td></td>
<td></td>
<td>Remote education, remote counseling (elementary/junior-high/high schools), U-Test Bed (colleges, universities)</td>
</tr>
<tr>
<td>Community Information Centers</td>
<td></td>
<td></td>
<td>Underground management (GIS), energy management system, system for detecting environmental pollution/disasters</td>
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<tr>
<td>Transportation</td>
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<tr>
<td>Roads</td>
<td></td>
<td></td>
<td>Telematics/ITS:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- route guidance, automatic accident handling, automatic fee payment, parking guidance, etc.</td>
</tr>
<tr>
<td>Bus Stop</td>
<td></td>
<td></td>
<td>BIS System/Devices, mobility assistance for the handicapped</td>
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<tr>
<td>Outdoor Environment</td>
<td></td>
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<tr>
<td>Park</td>
<td></td>
<td></td>
<td>IT kiosks, water quality management system</td>
</tr>
<tr>
<td>Open Space (Squares, etc.)</td>
<td></td>
<td></td>
<td>IT kiosks, CCTV’s, IT billboards</td>
</tr>
<tr>
<td>IT Street</td>
<td></td>
<td></td>
<td>IT product exhibition and trial systems; IT kiosks</td>
</tr>
<tr>
<td>Integrated City Network</td>
<td></td>
<td></td>
<td>With appropriate size and equipment, remote monitoring function, and</td>
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<td></td>
<td></td>
<td></td>
<td>remote automatic control function for integrated management of disasters,</td>
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<td></td>
<td></td>
<td></td>
<td>environment, transportation, energy, and rescue systems.</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td>Plan for the development and administration of H/W and infrastructure in consideration of the required functions</td>
</tr>
</tbody>
</table>
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build a highly integrated and networked human settlement as a self-contained city. With the ICTs and the U-city planning principles, KBUD was suggested for (Yim, 2006):

- Use as a test-bed for the latest ICTs, which can allow all the citizens to access the Internet anywhere and anytime.
- Provision of healthy and safe residential environment using ICTs.
- Convenience with various home-network services.
- Living together with the disabled, the elderly, and the poor, supported by various ICT systems and U-services all over the city.
- Foundation for ICT industries, which can promote regional economy growth.
- Comprehensive urban management system by Urban Integrated Network Centre.

Table 2 below illustrates the details in ICTs applied to the Unjung urban planning. Various ICT systems are used in the segment of the city plan with wired or wireless technologies. There are several knowledge-based facilities and services shown in the table and these are heavily relied on the wired system, except the community information centers where GIS is mainly used.

Fiber-optic cables will be distributed throughout the city. Wireless installations in each building are recommended. Focusing on the development and provision of the infrastructure, systems, and information services, designs of some specific devices also may be required (devices for public housings, home-gateway, telematics devices, IT kiosks, etc.). The residence means public housing (9,600 households).

Regarding the ICTs used in Unjung city, city officials suggested some important measures for the U-city development, which include (Yim, 2006):

- All stages of the development process from a planning stage to a construction completion and maintenance stages must be linked to each other.
- The concept of the proposed urban development strategy should be considered with the characteristics of the U-city as well as the target population demography.
- Types and functions of each urban infrastructure must be assessed and provided in accordance with the proposed concept for the U-city development.
- Applications of ICTs should be complied with the concept for the city development and other characteristics of the city.

For the development of a successful U-city model from conceptual framework to everyday life, KNHC and KT will jointly invest 90 million U.S. dollars to build the latest wired/wireless infrastructure, such as WLAN, WiBro, WCDMA, FTTH, and BcN in Unjeong by 2009. As a result of this, the residents of Unjeong will be able to access information “whichever, whenever and wherever.” Integrating the existing media and Internet services using the wired/wireless infrastructure Unjeong aims to:

- Build ICT infrastructure (wired/wireless telecommunication network) so that inhabitants may access information, “whichever, whenever and wherever”.
- Integrate the existing media and Internet services using the BcN.
- Construct intra-urban digital networking for a highly integrated and networked new city in which multiple infrastructures and services of garbage, sewerage, business, fire and security deliver centrally to individuals.
- Provide a Y-generation ICTs, such as WLAN, WiBro, and WCDMA for the wireless telecommunication future.
- Extend ICT infrastructure to the neighboring towns and cities (snowball effect).
• Create a knowledge spill-over effect by sharing ICT infrastructure.

Apart from the ICTs and its application, the U-city management policies should be clearly addressed. Unjeong U-city planning focuses on two major urban management issues. First, it aims to provide an efficient planning delivery system in terms of planning law, regulation, and cost in order to minimize the complexity of the existing new towns. Second, the effectiveness of urban management policy is emphasized as to policy adequacy, synergic application, and residential satisfactory. It is necessary to set up a specific management policy to 94 U-services planned in the area of transport, water, fire, security, amenity, smart card, management, and ICT portal. Key management policies used in Unjeong aim to:

• Use ICTs to monitor the entire service networks in the area of environmental protection, water supply, and sewerage and sewage treatment.
• Provide an early warning system from the meteorology service, earthquake data collection service, and alarming and video monitoring services.
• Improve public health service using home-care service, emergency calling service for elderly and disabled.
• Expand the Smart card service not only to public transport but also to other public utilities, such as schools, post offices, hospitals, and community centers.

As an additional U-cities experience in new cities, Multifunctional Administrative City and nine Innovative Cities driven by public sector, as well as five Enterprise Cities by firms are under way of planning the new U-cities. The Multifunctional Administrative City is so called the little capital to be made in the Yongi-Kongju area in South Chungchong Province, where the government will move two-thirds of government ministries out of Seoul as early as 2012. The government is pushing forward Innovative Cities for the relocation of the public institutions in Seoul Metropolitan Area to nine provincial regions. Besides Innovative Cities, Enterprise Cities also are on the horizon, focusing on eco-tourism, and knowledge-intensive industry—the knowledge-based cities are being built by private sectors in the underdeveloped regions.

CONCLUSION

The fast development of ICTs remains the question to planners and civil engineers how we effectively use those technologies in urban development, design, and planning. In this chapter, the authors tried to demonstrate the great potential and benefits of the latest ubiquitous computing technologies for KBUD. U-city is the conglomeration of a knowledge-based society, where even inanimate objects communicate with persons or objects, and make a decision with intelligence. Ubiquitous computing environment helps in KBUD in which planners forecast a futuristic society, provide mobile/built infrastructure, and design the U-city spatial structure. The authors suggest that U-city urban form in ROK should be the decentralized concentration network with compact, mixed, and programmable land uses.

ROK is looking forward into building U-city as a leverage for the national economy and also for creating future urban growth engines. Korea-led U-city concept, planning and design schemes, and management policies are newly developed and controversial to conventional urban and regional planning and its methodological perspectives. One of the most important concepts in U-city is the experimental urban planning approach, which is the combination of ICTs and ubiquitous computing. Public participation in planning decisions is fuelled by the fast data acquisition, monitoring, and experimental computer simulation. The integrated u-city network management center plays a
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core role in collecting, inter-correlating, analyzing, and distributing urban information.

Due to the fast growing U-city technologies, there is a strong possibility to improve the current conditions of urban management in ROK. Enhanced database management systems make real time data update possible, which means that planners can overcome heavy dependence on existing data. The improvement of U-city technologies encourages planners to use Web applications, which provide good opportunities to communicate with people in distance, to see timely results according to instant input, to get many people involved in the planning process, and to get fast feedback in cyberspace. While conventional urban planning spent lots of time and money to experiment a new policy, ICT development makes planners experiment a new policy with ease and low cost. Using virtual space, planners let people and markets know possible updated information and encourage them to participate in a decision-making process of urban planning. Therefore, U-city technologies are capable of upgrading the conventional urban planning methods, such as qualitative and quantitative methods, and provide a scientific and transparent urban planning and management through real-time data acquisition, monitoring, analysis, and last, would likely be able to boost public/market participation more than ever before.

FUTURE RESEARCH DIRECTIONS

Advancing ICT technologies, globalization of cultures, and the rapidly emerging knowledge economy are generating a tough global completion for investment and talent, particularly for creative urban regions. The Korean government uses the ubiquitous strategy as a method of KBUD to establish their place as a leader in the global arena. Continuum and careful implementation of the promising U-city strategy would likely bring success to Korean cities. However, the successful U-city development needs the collaboration of national government, city councils, universities, public cooperation, and private companies. From this view, the Korean government encourages partnerships with other local and foreign consortiums and companies in the KBUD process. Nevertheless, in this context, democracy and market-oriented urban planning and management are two key issues that Korea needs to do more work on in the near future.

REFERENCES


ADDITIONAL READING


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Section III
Knowledge-Based City, Economy, and Development
Chapter X
Biotechnology and Knowledge-Based Urban Development in DNA Valley

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George Mason University, USA

ABSTRACT
The internationalization of Big Science programs, such as the Human Genome Project to map the human genome, heralds the arrival of a new model for knowledge-based urban development driven by scientific advancements in biotechnology. Indeed, the biotechnology industry is a potent engine for knowledge-based urban development around the globe. While the most famous example of biotechnology-driven, knowledge-based urban development is Biopolis in Singapore, the National Capitol region of the United States is home to an emerging biotechnopole known as DNA Valley. Using a case study approach to compare and contrast DNA Valley with past examples of knowledge-based urban development in the United States, this chapter highlights the challenges for sustainable knowledge-based urban development in the global biotechnology industry and the practical steps public and private stakeholders can adopt to sustain knowledge-based urban development based on biotechnology.

INTRODUCTION
The Washington, DC-MD-VA Metropolitan Statistical Area (MSA) in the United States is a new example of how biotechnology can spawn knowledge-based urban development (KBUD). In particular, the I-270 (Interstate 270) Technology Corridor in Maryland, which stretches from Bethesda to Frederick, also known as DNA Valley, is a new biotechnopole. DNA Valley is home to 368 biotechnology establishments—one of the largest agglomerations of biotechnology establishments in the United States. In close proximity to: the National Cancer Institutes in Frederick and Bethesda; the National Institutes of Health in Bethesda; the National Institute of Standards
and Technology in Gaithersburg; and the National Science Foundation in Arlington, Virginia, DNA Valley has become a magnet for human capital centered on biotechnology product development. In fact, there are more PhDs and MDs per capita within a 10-mile radius of the District of Columbia than anywhere else in the United States (George, 2004). Drawn by favorable man-made and natural amenities unique to the National Capitol region, many highly skilled entrepreneurs are making their careers by developing products for future biotechnological applications in DNA Valley.

The purpose of this chapter is to discuss the challenges to sustain KBUD in DNA Valley. Using previous examples of KBUD in the United States, such as Silicon Valley in California and Route 128 in Boston, Massachusetts as points of comparison, the author discusses the unique local and regional challenges that public and private stakeholders in DNA Valley confront to sustain KBUD. Discussion of the various measures public and private stakeholders in DNA Valley adopt to confront these challenges highlight the need for public and private stakeholders to act to offset imperfections in the biotechnology market.

The organization of the chapter is as follows. The next section provides background on the biotechnology industry in the United States and contains subsections that define KBUD, and provide background on KBUD in the United States. The following section provides the main thrust of the chapter and includes subsections on the problems and best practices for sustainable KBUD in DNA Valley. The chapter concludes with a review of the challenges to sustain KBUD in DNA Valley and future research directions on biotechnology and KBUD.

**BACKGROUND**

**Biotechnology**

Worldwide, the growth and development of the biotechnology industry is one important source of KBUD. In the United States, the biotechnology industry encompasses four different classes and 12 different subclasses of the North American Industry Classification System (Table 1) (United States Bureau of the Census, 2006). Pharmaceutical and medical manufacturing includes: manufacturing biological and medicinal products; processing botanical herbs and drugs; isolating active medicinal agents from botanical drugs and herbs; and manufacturing pharmaceutical products for internal and external consumption. Electromedici-

<table>
<thead>
<tr>
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<tr>
<td>3254</td>
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</tr>
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<td>5417</td>
<td>Scientific Research and Development Services</td>
</tr>
<tr>
<td>541710</td>
<td>Research and Development in the Physical, Engineering, and Life Sciences</td>
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</table>
Biotechnology and Knowledge-Based Urban Development in DNA Valley

cal instrument manufacturing includes manufacturing: magnetic resonance imaging equipment; medical ultrasound equipment; pacemakers; hearing aids; electrocardiographs; and electromedical endoscopic equipment. Medical equipment and supplies manufacturing includes manufacturing: laboratory apparatus; surgical and medical instruments; surgical appliances and supplies; dental equipment and supplies; orthodontic goods; dentures; and orthodontic appliances. Finally, scientific research and development (R&D) services includes R&D in the physical, engineering, and life sciences.

In 2004, total employment in the United States in pharmaceutical and medicine manufacturing and scientific R&D services was 773,240 (United States Department of Labor, 2006). Given the trends for the United States’ population to increase in number and age, the occupational outlook in biotechnology is bright. Pharmaceutical and medicine manufacturing is one of the fastest growing manufacturing industries in the United States—the United States Bureau of Labor Statistics projects employment will increase 26 percent by 2014. Demand for over-the-counter and prescription drugs, vaccines, analgesics, as well as drugs for life- and nonlife-threatening diseases continues to increase. Likewise, biotechnology continues to generate employment growth in scientific R&D services and demand for engineers and scientists, particularly employment opportunities in the life sciences and the medical sciences, continues to increase.

Pharmaceutical and medicine manufacturing and scientific R&D services establishments are found in most of the United States. However, most are found in only six states—California, New York, Massachusetts, Illinois, New Jersey, and Michigan. The concentration of biotechnology establishments in the United States is attributable to the educational requirements in the biotechnology industry. Approximately 60 and 70 percent of employees in the pharmaceutical and medicine manufacturing and scientific R&D services industries, respectively, have a postsecondary education. The minimum educational requirement for engineers and scientists is a PhD or an MD. Increasingly, scientific R&D service establishments prefer applicants with a PhD to complete a postdoctoral period of academic research. Further, the pace of scientific advancements requires employees from both types of establishments to attain and maintain biotechnology competency. Since biotechnology is an interdisciplinary field, a biotechnology career requires knowledge of the biological sciences as well as bioinformatics. Bioinformatics is a branch of biotechnology that uses information technology to study biological data. Local labor markets in the above six states enjoy a competitive advantage because each has postsecondary educational institutions with a strong reputation for basic and applied research in biotechnology and bioinformatics where knowledge workers can attain and maintain biotechnology competency.

Self-employment is uncommon in the scientific R&D services industry because of exorbitant start-up costs. New ventures are most often in fields with the greatest prospects for return on investment capital. Therefore, synergy between venture capital and entrepreneurs is necessary to foster and sustain KBUD from biotechnology.

Innovations in chemistry, physics, electronics, nuclear, computer, and information technology in the 20th century. In the 21st century, innovation in biology is leading to scientific advancements in biotechnology. In particular, the Human Genome Project to map the human genome has greatly improved our knowledge of genetics. This knowledge holds the promise for a new generation of drugs to combat cancer, infectious diseases, autoimmune diseases, neurological disorders, and HIV/AIDS. However, translating this knowledge into new drugs has only just begun. Given that the Department of Energy’s Human Genome Program and the National Institutes of Health’s National Human Genome Research Institute were
the sponsors for the Human Genome Project, it stands to reason that the Washington, DC-MD-VA MSA would serve as an ideal natural laboratory to study how biotechnology spawns KBUD. Further, given that DNA Valley is one of the newest technopoles in the United States, it also serves as an ideal natural laboratory to study how public and private stakeholders cooperate to foster and sustain KBUD.

Knowledge-Based Urban Development

The conditions for KBUD are numerous (Knight, 1995). The overwhelming evidence indicates that knowledge spillovers from basic scientific research drive KBUD. In the United States, this knowledge emanates from basic scientific research funded by the federal and state governments, universities, and nonprofit organizations. Another ingredient for KBUD is access to a pool of knowledge workers in local labor markets. To that end, attaining and maintaining urban quality of life is important to attract and retain knowledge-based establishments and workers. Investment capital also must be available to the self-employed to develop biotechnology products and services. Finally, KBUD is synonymous with a well-defined regional identity and a well-developed knowledge and transportation infrastructure.

The classic examples of KBUD in the United States are Silicon Valley and Route 128. The history of their growth and development provides lessons on their similarities and differences from proven and unproven technopoles in the United States (Herbig, 1994). Both had an initial leading entrepreneur whose success was a catalyst for further entrepreneurship. Silicon Valley and Route 128 grew in proximity to prestigious institutions of higher education with a basic scientific research focus to develop technology and business schools to foster entrepreneurship. In addition, Stanford and the Massachusetts Institute of Technology, respectively, were private institutions so governmental bureaucracy was not an impediment. In California and Massachusetts, physical infrastructure, skilled labor, R&D facilities, and market accessibility were already in place due to the legacy of the national defense industry in Silicon Valley and on Route 128. Therefore, the initial business development costs in both Silicon Valley and Route 128 were low. Creative destruction of agricultural land and manufacturing plants meant expensive commercial real estate would not prematurely bankrupt small, high-technology establishments that were undercapitalized. Both Silicon Valley and Route 128 champion entrepreneurialism and risk-taking and private businesses were seen as the key to prosperity. Venture capital was available to high-technology entrepreneurs when Silicon Valley and Route 128 were growing and developing. Federal, state, and local support for military and space programs also was a catalyst for growth and development in both Silicon Valley and Route 128. For example, the Massachusetts Technological Development Corporation, a quasi-public stakeholder in Massachusetts was a source of venture capital and management assistance to new high-technology establishments. Likewise, Industrial Revenue Bonds were a source of financial assistance from the State of Massachusetts. California and Massachusetts also had strong secondary educational systems for the children of high-technology employers and employees. In both Silicon Valley and Route 128, an agglomeration effect led to the spinoff of other ventures. Further, both Silicon Valley and Route 128 took 15 to 20 years to become technopoles. Silicon Valley became a technopole in the 1970s, approximately 20 years after William Shockley started up Shockley Labs, and Route 128 became a technopole in the 1980s, approximately 20 years after Kenneth Olson started up Digital Equipment. Finally, contrary to the industrial era when firms had to locate so as to maximize access to natural resources, firms in the postindustrial era were able to locate so as to maximize access to man-made and natural amenities to cater to the quality of
life of their human resources. To that end, both Silicon Valley and Route 128 had a supply of man-made (cultural and recreational) and natural amenities to satisfy the quality of life demands of employers and employees. In conclusion, the similarities between Silicon Valley or Route 128 and unproven technopoles seem to indicate that KBUD is possible in many different locales in the United States.

Unfortunately, planning for KBUD is a difficult task. Just putting all of the high-technology pieces into place does not assure a region will ever experience the long-term benefits from strategic investments in the highly competitive, global knowledge-based economy. The competition between regional economic development stakeholders to attract high technology employers and their high-human capital employees is fierce. Likewise, investments in the knowledge infrastructure (Goldstein, 2005) by national, state, and local governments can provide the raw materials, but, ultimately, private interests provide the entrepreneurial engine for such development. If places are to follow the best practice in regional economic development and become learning regions (Florida, 1995; Morgan, 1997) then leakage of human resources via outmigration, also known as brain drain, must not occur. Brain drain saps a region of creative risk-takers who might be the initial leading entrepreneurs for the next Silicon Valley or Route 128. Brain drain occurs because either the quality of life is not competitive or the knowledge culture is weak (Malecki, 2000). Knight (1995) warns that urban stakeholders must be proactive and respond rapidly to the loss of even a few key personnel or organizations because causation can become cumulative and accelerate an irreversible brain drain that can greatly weaken learning regions.

It is one thing to attract high-technology firms with incentive packages that surpass those from other aspiring technopoles, but postindustrial firms are more locationally fickle than were their industrial counterparts. Just as amenities may attract high-technology firms their agglomeration may create disamenities. Further, higher costs of living and costs of doing business can sabotage the development of learning regions after their rapid growth. For example, in their discussion of the most well-known examples of KBUD in the United States, Herbig (1994) and Campbell (1995) discuss the issues that can sabotage the sustainable development of learning regions. Herbig lists: high costs of living, especially for housing; anti-business and government interference; high costs of doing business; future growth patterns; declining education standards; as well as long commutes and a general decrease in the quality of life as symptoms of inevitable decline in Silicon Valley. Campbell lists a rigid local knowledge culture that inhibits interactions between creative, highly skilled people, and the progressive retreat of venture capital as signs of a mid-life crisis on Route 128. The collapse of the Massachusetts Miracle was due to high housing costs, high costs of living, which inhibited the inflow of new labor; excessive governmental taxation and regulation, which inhibited the transplantation of new business; anti-business rhetoric; loss of high-technology manufacturing plants; too narrow of a focus on segments of the high-technology industry that had matured and were in decline; and an erroneous assumption that high-technology employers and employees were attached to Route 128. A large pool of highly skilled labor is both an asset and a liability for learning regions. After a time, boom becomes bust and other regions become more attractive as the learning region grows and develops. Therefore, urban stakeholders must not only satisfy the conditions to attain KBUD, but they also must maintain the incentives to sustain KBUD.

DNA Valley

Silicon Valley and Route 128 are the most well-known examples of KBUD in the United States. Their success is well-chronicled in the academic
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literature and the popular press. Locational advantages with regard to access to human and venture capital and amenities are the most-often cited explanations for their past and present success. But while Silicon Valley and Route 128 are the symbols of KBUD in the United States, more recent examples of KBUD provide new insights to help both public and private stakeholders in the United States and elsewhere to develop and implement economic development policies to foster and sustain KBUD in the 21st century.

One new example of KBUD is DNA Valley in the National Capitol region of the United States. The history of DNA Valley highlights the synergy between biotechnology and KBUD in the 21st century economy of the United States. To compare and contrast the growth of DNA Valley with the growth of Silicon Valley and Route 128, the initial leading entrepreneur in DNA Valley was Wayne Hockmeyer, former head of immunology at the Walter Reed Army Institute of Research in Silver Spring, Maryland. Dr. Hockmeyer started up MedImmune in Gaithersburg, Maryland in 1988. As the anchor for other biotechnology establishments in DNA Valley, MedImmune produces drugs for infectious diseases and cancer, and currently has five products on the market. Another anchor in DNA Valley was Celera Genomics started up by Applera Corporation and Craig Venter, formerly of the National Institutes of Health, in Rockville, Maryland in 1998. Celera Genomics was the private establishment set up to sequence the human genome simultaneously with the public initiative. Celera Genomics is now a drug-discovery establishment. The Institute for Genomic Research (TIGR), also started up by Craig Venter in Rockville, Maryland is another anchor in DNA Valley. But unlike other establishments in DNA Valley, TIGR conducts only basic scientific research to produce publications, not applied scientific research to produce drugs. Like Silicon Valley and Route 128, DNA Valley grew in proximity to a private institution of higher education, Johns Hopkins University in Baltimore, Maryland. But, unlike Silicon Valley and Route 128, DNA Valley also grew in proximity to a public institution of higher education, the University of Maryland whose main campus is in College Park, Maryland. Therefore, a public institution of higher education was a facilitator, not an inhibitor, of KBUD in DNA Valley. As for the availability of venture capital, Maryland was home to the third largest number of biotechnology establishments in the United States behind California and Massachusetts, and, on a per capita basis, Maryland was home to the second largest number of biotechnology establishments behind only Massachusetts in 2000 (Ernst & Young LLP, 2001). But, relative to the number of biotechnology establishments in other states, those in Maryland raised less private venture capital than those in 11 other states. The gap in private venture capital funds in Maryland was $50 to $100 million per year and state government programs were unable to bridge the gap. Such a gap was evident because venture capital is a local business and less venture capital was available in the National Capitol Region than elsewhere (O'Hara, 2006). Further, valuation of biotechnology establishments, that is, economic estimates of a biotechnology start-up’s worth, were difficult to come by because of the inordinate amounts of time and money necessary to screen new drugs and gain approval for their commercial use (Stewart, 2002). To compensate for the venture capital gap, the state of Maryland set up the Maryland Venture Fund to foster more venture capital activity. Although not only for biotechnology start-ups, more than 50% of the Maryland Venture Fund goes toward biotechnology. Finally, the military (Manhattan) and space (Apollo) programs responsible for growth and development in Silicon Valley and on Route 128 were intranational in scope and private industry was not a partner (Lambright, 2002). However, the genome (Human Genome Project) program responsible for growth and development in DNA Valley was international in scope and private industry was a partner. Therefore, the model
for Big Science programs in the 21st century is different from the Big Science programs of the 20th century. The emergence of private industry as a partner in Big Science programs means that public and private stakeholders must cooperate to fulfill the promise of scientific advancements in the 21st century.

The next section details the problems that public and private stakeholders had to confront to sustain KBUD in DNA Valley. The subsequent section details the best practices for KBUD from the approximately 20 year history of DNA Valley.

**ISSUES, CONTROVERSIES, PROBLEMS**

The problems that public and private stakeholders have to confront to sustain KBUD in DNA Valley are similar to the problems that public and private stakeholders had to confront in Silicon Valley and on Route 128. However, public and private stakeholders in DNA Valley, and other new examples of KBUD, have to confront different problems than their predecessors. Region-specific issues, such as the availability of venture capital and the leakage of biotechnology human capital impact KBUD in the National Capitol learning region. Further, the high-risk product development cycles emblematic of the biotechnology sector, in general, impacts KBUD based on a biotechnology model because of stringent federal regulation of the pharmaceutical and medicine manufacturing industry in the United States. What follows is a more thorough explication of the regional and national factors with the greatest impact on KBUD in DNA Valley. The subsection concludes with a discussion of the urban planning aspects of KBUD in DNA Valley, the role of local and state governments in the spatial urban development of DNA Valley, and the dominance of biotechnology market forces in the growth and development of DNA Valley.

As in Silicon Valley and on Route 128, venture capital is important for KBUD. Irrespective of the 21st century buzz on the flattening of the earth, the elimination of state borders, and the general demise of geography, distance is still very important in the venture capital business. In fact, many venture capitalists abide by the 20-minute rule—start-ups must locate within a 20-minute drive (Stross, 2006). The 20-minute rule serves the interests of both venture capitalists and entrepreneurs; venture capitalists require frequent contact and entrepreneurs whose establishments are in the seed stage (venture funds of less than $1 million) or in the early stage (venture funds from $1 million to $10 million) benefit from the attention. Nationwide, approximately 30% of venture capital lands in Silicon Valley and 10% lands in New England, home to Route 128. Indeed, Silicon Valley is home to the highest concentration of venture capital in the world. In the National Capitol region, the venture capital business is local as in Silicon Valley. However, the $1 billion venture capital business in the National Capitol region pales in comparison to the major hubs of venture capital in the United States (O'Hara, 2006). In other words, the venture capital business in the National Capitol region is nascent, not mature like in Silicon Valley or on Route 128. The unavailability of venture capital is particularly problematic for biotechnology establishments in DNA Valley that want to transition into product development and manufacture. The maturation of the venture capital business is, therefore, an important key to sustainable KBUD in the National Capitol region.

While the availability of venture capital is important, differences in product development cycles between computer technology, for example, and biotechnology also impacts KBUD in DNA Valley. That is, the product development cycle for computer technology on Route 128, for example, was less time-consuming and less regulated than is the product development cycle for biotechnology.
in DNA Valley. The pharmaceutical and medicine manufacturing industry in the United States is the most highly regulated manufacturing industry in the world. In the end, the product development cycle in biotechnology can last a decade and can cost hundreds of millions of dollars. The exorbitant cost of product development for biotechnology establishments is a burden for start-ups in DNA Valley. On Route 128, knowledge of product life cycles was a key component of public policy to foster sustainable KBUD. That is, programs set up by the state of Massachusetts to transfer technology from institutions of higher education to industry, to provide start-ups with venture capital, and to train labor for high-technology employment were dependent on technological developments to produce new minicomputer products. In the biotechnology industry, in general, and in DNA Valley, in particular, the promise of new products is greater than the reality. That is, most biotechnology establishments in DNA Valley have yet to translate knowledge of the human genome into products. So not only is short-term venture capital an issue, but long-term product development cycles in DNA Valley also impact KBUD.

Finally, leakage from learning regions in the form of outmigration of human resources is a universal problem for sustainable KBUD. But brain drain is particularly problematic in the pharmaceutical and medicine, and the scientific R&D services industries, which are so reliant on creative, risk-taking people. In general, the National Capitol region does not suffer from brain drain. In fact, several sub-regions in the National Capitol region are the fastest growing of their size in the United States since 2000. However, the National Capitol region, as well as other learning regions, must address the problems of technology transfer and biotechnology brain drain. That is, how to transfer knowledge from federal and university research institutions to the private sector and how to prevent brain drain of postdoctoral fellows. Each year, from 1,500 to 2,000 postdoctoral fellows arrive in the National Capitol region to do research at the National Cancer Institute, the National Institutes of Health, and the National Institute of Standards and Technology, to name a few federal research institutions (Sternbach, 2006). Approximately the same number becomes university research fellows in the National Capitol region every year. Fellowships usually last from one to four years; afterward, most fellows pursue academic positions in their field of expertise. Since the rate of increase in postdoctoral positions is greater than the rate of increase in academic positions, the loss of postdocs is a form of leakage. Further, postdocs who forgo an entrepreneurial career track for an academic career track are not available to aid in the transfer of basic scientific knowledge to applied technological production, which is the engine for KBUD from biotechnology.

Another, more recent, source of leakage from the National Capitol region is international competition for biotechnology human capital from Singapore. The controversy in the United States over federal funds for stem cell research and the emergence of Singapore as a biotechnopole has led to the loss of several prominent scientists from the National Capitol region to Singapore. Since the federal government provides approximately 25% of all scientific R&D funds, the Bush administration policy to restrict federal money for stem cell research has a profound impact on the United States biotechnology industry. Concurrently, Singapore, which saw lower returns from the electronics industry, began a biotechnology initiative in 2000 (Arnold, 2006). Relying on the same tax holidays and incentives that made it the base for the world’s largest electronics manufacturers, Singapore has been able to attract multinational pharmaceutical and medicine manufacturers such as Merck, Pfizer, and Schering-Plough. To promote basic scientific research, Singapore also pays up to 30% of construction costs for biotechnology establishments. But the jewel of the Singapore biotechnopole is Biopolis, the new 2 million square foot research center built
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at a cost of 500 million Singapore dollars in 2003. Biopolis is a seven-building, biotechnology complex that houses state of the art equipment and a laboratory animal facility. Biopolis also will soon house a stem cell bank. Stem cells are the building blocks for specific tissues, and scientists hope to use stem cells for medical treatments. One of first scientists that Singapore was able to attract was Alan Colman, a member of the team that cloned Dolly the sheep, from Scotland. Unable to secure funding in the United Kingdom or the United States for long-term product development for diabetes, he was able to secure funding from the Economic Development Board in Singapore. The most high profile arrivals from the National Capitol region are Neal Copeland and Nancy Jenkins, a husband-and-wife team who were at the National Cancer Institute for 20 years. Not every transplantation from the United States is a success—a joint venture at Biopolis with Johns Hopkins University is to close down because the government claims Johns Hopkins did not attract enough talent—and Singapore spends far less than the United States on biotechnology. Nonetheless, international competition for biotechnology human capital from Singapore portends greater worldwide competition for human resources in the biotechnology industry.

What is absent from this subsection is a discussion of the urban planning aspects for KBUD in DNA Valley. While urban development in the United States is more market-driven than elsewhere, accessibility within DNA Valley and between DNA Valley and other biotechnopoles, as well as incentives from local and state governments, continue to contribute to KBUD in DNA Valley. The I-270 Technology Corridor is highly accessible via a modern, intermodal transportation infrastructure. DNA Valley also is approximately equidistant from Boston and Atlanta as well as London and Los Angeles and is, therefore, at the epicenter of the global biotechnology industry (Maryland Department of Business & Economic Development, 2007). Further, state and local governments provide tax incentives and other business assistance services, such as site selection, fast track development, demographic and real estate trend data, financing, workforce development as well as networking and referrals to firms new to DNA Valley (Rockville Economic Development, Incorporated, 2007). From an urban planning perspective, the preeminence of biotechnology market forces in the spatial urban development of DNA Valley and the spatial disconnect between homeplace and workplace development in the United States is no more evident than in DNA Valley. MedImmune and Kentlands, the well-known New Urbanist community, occupy adjacent parcels of land in Gaithersburg, Maryland. While MedImmune and Kentlands were developed at approximately the same time, each is only accessible to the other across Great Seneca Highway which is a medianed, four-lane highway. The spatial irony that the anchor for DNA Valley is only accessible to a walkable, mixed-use development via automobile belies the extent of urban planning in other examples of biotechnology-driven KBUD such as Singapore’s Biopolis and poignantly reflects the primacy of economic considerations for KBUD in the United States.

Solutions and Recommendations

As Malecki (2000) notes, it is not likely that all places can become learning regions. What is important is for public and private stakeholders to focus on regional strengths to create a regional knowledge culture (Knight, 1995). Further, since human capital is the most important asset in the global knowledge economy, efforts to attract and retain human resources are paramount. Given that knowledge resources are part of the local economic development culture, policy to foster and sustain KBUD must fit the identity of the learning region. The following are anecdotal examples of efforts by public and private stakeholders in DNA Valley, and elsewhere, to confront issues that can stifle KBUD.
To confront the vacuum of venture capital for biotechnology start-ups in DNA Valley, John Holaday, former CEO of EntreMed in Gaithersburg, Maryland, started up the Harvest Bank of Maryland in Rockville (George, 2004). The goal of the bank was to support the financial needs of biotechnology establishments in the region by bridging the knowledge gap between scientists and bankers. To address the valuation vacuum for biotechnology establishments, Jeffrey Stewart, President of the Clinical Capital Group, put forth a method to determine the value of biotechnology R&D assets, which reassesses valuations in light of outcomes from clinical trial events (Stewart, 2002). To confront the long-term product development cycles in DNA Valley, a new business model for biotechnology establishments is now evident. Craig Rosen, former COO of Human Genome Sciences in Rockville, Maryland, and his partner, Steven Mayer, started up CoGenesys not to produce drugs, but to test new products for big pharmaceutical and medicine manufacturing establishments (Rosenwald, 2006). The idea is for CoGenesys to become a drug-development engine for big pharma and financially self-sufficient sooner than is normal for biotechnology establishments. Finally, to address the issue of the leakage of postdocs from DNA Valley, a consortium of public and private stakeholders from the region and the nation such as the City of Rockville, Maryland, the American Association for the Advancement of Science (AAAS), and the National Resource Council have organized an annual conference for postdocs from the National Capitol region to explore opportunities for entrepreneurial, traditional, and alternative career tracks in biotechnology (Sternbach, 2006). Panel sessions on the three career tracks are available to postdocs as is advice on how to land a job in the private sector. The collaborative nature of the conference highlights the important role that public and private stakeholders have in the promotion of biotechnology transfer and in the retention of human capital in the National Capitol region and nationwide.

Each of the above anecdotes provides an example of how public and private stakeholders in DNA Valley and elsewhere confront issues that can stifle KBUD. But future trends in the biotechnology industry and Big Science programs that serve as the catalyst for technological innovation worldwide indicate that competition for biotechnology establishments and human resources will intensify at the regional scale within the United States and at the national scale worldwide.

CONCLUSION

Conceptualizing and strategizing for KBUD by policymakers is a much easier task than is creating and sustaining public and private partnerships. Human capital and infrastructural investments from national, state, and local government can provide the raw materials, but, ultimately, private interests provide the entrepreneurial engine for such development. Indeed, regional economic development stakeholders have become enamored with generating fiscal windfalls by attracting high technology employers and their high-human-capital employees. Unfortunately, just putting all of the high-technology pieces into place does not assure a region will ever experience any of the long-term benefits from strategic investments in a knowledge-based economy.

The difficulty in delivering sustainable KBUD is a multifaceted problem. It is one thing to attract high-technology firms with incentive packages that surpass those from other aspiring technopoles. Certainly quality of life is a determining factor in where high-technology establishments and their corporate leadership ultimately locate and thrive, and not every city can compete with the man-made and natural amenities in Silicon Valley or on Route 128, for example. As well, social networks of venture capitalists willing to fund high-risk,
knowledge-based production must develop and mature to sustain KBUD. Likewise, the areas that have enjoyed sustained KBUD have a well-defined geographic identity with well-developed knowledge and transportation infrastructures. Finally, the evidence indicates that knowledge spillovers from basic scientific research drive KBUD. This basic scientific research usually originates at premiere educational institutions, particularly in the United States, where federal and state funding provides the setting for innovation.

The above description of the essential ingredients for KBUD is well-represented by the growth and development of the biotechnology industry in the United States. Taking advantage of innovation partnerships with institutions of higher education and federal funding agencies, biotechnology establishments have become some of the most desirable establishments for urban areas to entice. The reason is self-evident given the worldwide growth of the biotechnology industry and the large share of regional production that such establishments command in their home regions across the United States.

The United States pharmaceutical and medicine manufacturing industry is prominent worldwide because of the significant amount of money spent on R&D to develop new drugs. A case study on KBUD in DNA Valley indicates that those investments have led to the emergence of a biotechnopole in the National Capitol region of the United States. The emergence of the private sector as a partner in Big Science programs such as the Human Genome Project has led to many innovations that foster and sustain KBUD in DNA Valley. Further, debate on whether or not our national and state restrictions on stem cell research put the United States at a competitive disadvantage in the global, knowledge-based economy is myopic. That is, Big Science in the 21st century is international in scope. Therefore, best practices for KBUD from biotechnology may not emanate only from the United States. In the end, international, interurban comparisons of KBUD that acknowledge the role that government policy, both national and subnational, plays in the biotechnology industry will be more informative for policymakers.

**FUTURE RESEARCH DIRECTIONS**

The controversy over stem cells in the United States may garner media attention, but stem cells are only one piece of the worldwide biotechnology puzzle. Governments in China, South Korea, Singapore, the United Kingdom, and other countries support stem cell research (Laidman, 2004). In the United States, no federal money is available for research to create new stem cells. But the international geography of stem cell research is not conclusive evidence that the United States is at a competitive disadvantage in the worldwide biotechnology industry. Scientists from the United States continue to publish more research on stem cells than scientists from other countries. Furthermore, biotechnology brain drain is not unique to the United States. For example, scientists from Europe have left for Singapore and the United States.

A more balanced reading of the worldwide biotechnology industry indicates that the international scope of the Human Genome Project was a catalyst for public and private investments in biotechnology worldwide. That is, much of the international competition in biotechnology is due to the internationalization of Big Science. Indeed, one of the future trends for the biotechnology industry is the increasingly international scope of the competition for biotechnology establishments and human capital. To that end, surveys of postdocs in the National Capitol region, as well as international and intranational surveys of biotechnology employers and employees, would provide insight into the market and nonmarket factors that have the greatest impact on locational decision making in DNA Valley and in the worldwide biotechnology industry.
REFERENCES


**ADDITIONAL READING**


Chapter XI
Beyond Planning: Sydney’s Knowledge Sector Development

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ABSTRACT
This chapter explores Sydney’s knowledge-based development, surveying reasons for its concentration of such development including the role of planning. Sydney’s high-knowledge industry concentration is seen as the product of the city’s commercial leadership, its high share of transnational corporations associated with Sydney’s global economy role, and its high proportion of skilled immigration. Such factors have resulted in a knowledge sector that is concentrated around central and near northern Sydney, and in the formation of several distinct clusters of knowledge-based industries. Case studies of the information technology and telecommunication industry and the multimedia industry suggest that Sydney’s concentration of corporate headquarters has been a key driver of growth in these industries, while the presence of a large pool of computer-based skills has stimulated and fed multimedia development. Metropolitan planning strategies have lacked firm principles for the development of knowledge-based industries. Instead, planning for these industries focused on a series of ad hoc place-specific initiatives that have been much less significant than market forces in supporting knowledge-based development in Sydney.

INTRODUCTION
This chapter explores Sydney’s knowledge-based development, surveying reasons for its concentration of such development including the role of planning. The chapter focuses on knowledge industry clusters, and includes case studies of Sydney’s information technology and telecommunications industry and multimedia industry clusters. It also discusses the relatively limited
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The role of spatial planning in Sydney’s knowledge sector development.

The objectives of the chapter are:

- To identify the scope and nature of knowledge-based economic development in Sydney.
- To explain the level and nature of Sydney’s knowledge-based development in general terms and by reference to two industry case studies.
- To analyze the role of spatial planning in the development of Sydney’s knowledge-based industries.
- To suggest future directions for Sydney’s spatial planning for knowledge industries and for research on these industries in contexts such as Sydney’s.

BACKGROUND

Knowledge Sector Development and Location under Contemporary Capitalism

The economies of affluent Western economies now rely increasingly on production sectors deriving their central competitive advantage from the development and application of new knowledge. With the global shift of manufacturing activities to developing countries, the competitive advantages of the West have focused on knowledge. These tendencies have been aided and abetted by intensified transport and communication advances, and the shortening of production cycles, facilitated by new technology and by social preference for more differentiated products. The more globally integrated economy of the 21st century has generated accelerating demand for, and use of, new knowledge to underpin the generation of new profit sources via the development of new products that have in turn fuelled greater competition. The new knowledge thus incorporated has been both technological and, increasingly, design-based (Lash & Urry, 1994).

In the latter decades of the 20th century, the growth of knowledge-intensive products in the West was argued to be central to a paradigmatic set of economic transformations associated with the transition to a so-called post-Fordist economy and a flexible accumulation mode of production (Piore & Sabel, 1984; Harvey, 1989). In this regime, spatial and technical flexibility of production was combined with the imposition of more flexible labor practices to allow more rapid uptake of new technology and design. Flexible accumulation also involved the contracting out of non-core activities (Freedman, 2004). In knowledge-based industries, this has seen the emergence of specialist knowledge producers, such as chip designers and software programmers, that have allowed cutting-edge concepts and ideas to be rapidly incorporated into new products. In addition, the creation of floating pools of specialized knowledge workers relying on episodic work contracts has allowed the rapid application of specialist skills to new knowledge products.

These trends have resulted in the emergence of groupings of knowledge-based firms at varying levels of spatial concentration. In many instances, the emergence of complexes of specialized knowledge-based, interlinked firms has had a spatial expression similar to that of 19th century Marshallian industrial districts, which were marked by dense input-output linkages between small specialist firms that were in close proximity to reduce transaction costs. Contemporary knowledge-based clusters of firms also have a tendency to concentrate spatially to reduce transaction costs, but also to share common facilities, draw on the same skilled labor pool, share tacit knowledge, and be better aware of developments in competing firms (Porter, 1990, 1998). Knowledge clusters also may develop because firms can take advantage of wider agglomeration economies generated by large cities, such as highly skilled labor used by a range of advanced
sectors (for example, IT professionals), a large and diversified client base (as in the case of IT firms), and advanced business facilities requiring high threshold populations such as international airports. The geographic scale of knowledge clusters is, however, not pre-determined and may be local or national/international—or both (Gertler & DiGiovanna, 1997)—depending on the industry and its global construction. In this, the relative importance of tacit knowledge exchange in each complex has been posited as being particularly critical in determining the localization imperative (Malmberg & Maskell, 2002, p. 433; Pinch et al, 2003, p. 375).

Concentrations of knowledge sectors within particular urban areas or parts of them may take a number of different forms. One of the characteristics of the contemporary, knowledge-based economy is an international division of labor and economic activity in which head offices and related activities of the increasing number of transnational corporations (TNCs) are concentrated in higher order cities, forming global command and control centers. These generate demands for localized advanced producer services that can help TNCs to maximize their profits across the globe. This generates clusters of law, accountancy and consultancy firms, among others, reinforced by linkages between such clusters in the production of new financial instruments and the like (Sassen, 1995). These clusters operate in parallel with clusters of high-order finance activities serving the needs of the TNCs and those of the global financial system, in general. The importance of trust and tacit knowledge in the finance sector reinforces the growth of traditional core locations in global cities, securing competitive advantage from the development of new financial tools and instruments.

A second type of knowledge cluster is based on advanced technology production, such as information technology (IT) or biotechnology. The paradigm here is Silicon Valley, with a corporate and social environment favoring knowledge exchange, and its bedrock of specialist labor, producers, and contractors, venture capitalists, and research institutions. High-tech clusters are most commonly located outside old Fordist industrial areas for reasons of image and the amenity preferences of their knowledge workers (Garreau, 1991; Hall, 1995, p. 6). As Markusen’s research on Silicon Valley attests, the economic foundations of such places can be built from various inter-linked processes coming together, thus producing what she terms “a mix of industrial district types” (Markusen, 1996, p. 308).

A third type of knowledge cluster can form around cultural knowledge generation. This type is relatively unexplored in the literature, with the exception of movie-making (Storper & Christopherson, 1987; Scott, 2000) and, to some extent, popular music and related areas (Scott, 1999; Gibson, Murphy & Freestone, 2002). In this type of cluster above all, tacit knowledge and face-to-face communication are centrally important, although communication technology developments have allowed various post-shooting functions in movie-making to be carried out across the globe. Urban knowledge clusters frequently combine the characteristics of basic cluster types, including the three above. IT clusters may contain a combination of the first and second types above. Advertising and multimedia clusters combine elements of the first and third types, as well as the second in the case of multimedia (Searle & DeValence, 2005).

In terms of exploring how knowledge-based urban development is generated, particularly via cluster development, two central questions emerge. First, what is the relative role of localization economies involving intra-urban input-output linkages (including knowledge linkages) between related firms in generating different urban-knowledge clusters, as against the role of general urban-agglomeration economies? Second, can spatial planning activities promote such development, and if so, how should this be done?
Beyond Planning: Sydney’s Knowledge Sector Development

We seek to address these questions using the case of Sydney, Australia’s largest and most globalized city. Building on previous work in which we critically examine claims about the rise of an Antipodean Silicon Valley in northern Sydney (Searle & Pritchard, 2005), this chapter positions those arguments in light of planning debates within the city. Consistent with our earlier arguments, we contend that the clustering of knowledge-based industries (particularly information technologies and telecommunications: ITT) in specific parts of Sydney’s metropolitan area signifies a complex set of processes at work that do not readily subscribe to features documented in studies from other places. They correspond to “a distinctive kind of industrial cluster” (Searle & Pritchard, 2005, p. 164) forged by an interaction between the urbanization economies of Sydney’s global engagement and the localization economies that are specific to particular sectors. As we argue:

Urbanisation economies produced by the demand for, and supply of, computer professionals by or to all sectors reinforce the ability of the ITT sector to meet the demand for specialised services by enlarging the pool of skilled labour. On the other hand, many computer services supplied to customers represent input-output links of a classical industrial district kind, not least because they rely on propinquity-based personal contact in terms of discussion of specialised off-the-shelf requirements or customisation of standard products. The urbanization economies of large demand across the city are frequently being worked out with a version of localisation economies in which several chains of simple vertically integrated relationships may exist for a single ITT firm where it serves several sectors (Searle & Pritchard, 2005, p. 164).

Although a series of planning initiatives have contributed to the growth of these sectors in Sydney, the predominant theme is one of accidental development, where planners have been challenged to keep up with private sector investments. Linking these insights to our earlier critique of Sydney’s ITT sector as being distinctive and having multi-faceted economic drivers, we conclude that there is not one planning recipe for the city. Rather than work to an overarching spatial plan, the key ingredient for planners is to build strong relationships with private sector entities so that urban infrastructures can be allocated consistent with the needs of private sector investors.

SYDNEY’S KNOWLEDGE SECTOR INDUSTRIES

There is no agreed statistical definition of knowledge industries, but some indication of Sydney’s place in the national knowledge industry sector can be gained by setting out Sydney’s share of

<table>
<thead>
<tr>
<th>Industry</th>
<th>Sydney SD employment</th>
<th>Share of Australian total employment (%) (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money market dealers</td>
<td>173</td>
<td>69.2</td>
</tr>
<tr>
<td>Financial asset broking</td>
<td>3,419</td>
<td>36.7</td>
</tr>
<tr>
<td>Computer consultancy services</td>
<td>34,869</td>
<td>36.7</td>
</tr>
<tr>
<td>Scientific research</td>
<td>4,629</td>
<td>18.6</td>
</tr>
<tr>
<td>Film and video production</td>
<td>3,232</td>
<td>43.1</td>
</tr>
<tr>
<td>Sydney total employment</td>
<td>1,755,407(1)</td>
<td>21.2</td>
</tr>
</tbody>
</table>
Australian employment in several industries at the core of this sector (Table 1).

(1) Factored up from Sydney SD total of employment by industry by share of not stated and inadequately described in NSW total of employment by industry. (2) Share of Sydney SD employment factored up by industry share of not stated and inadequately described in NSW total employment in the industry.

The limited data in Table 1 confirm that Sydney has disproportionate shares of Australian employment across most knowledge industries. Table 1 indicates that high-order finance industries and visual-media production are strongly concentrated in Sydney. Advanced business services, represented in Table 1 by computer consultancy services also are disproportionately focused on Sydney. Nevertheless, Sydney has a relatively low share of some knowledge industries less directly linked to corporate headquarters, as its under-representation in scientific research employment (Table 1) indicates.

There are a number of reasons for the concentration of knowledge industries in Sydney. These are a combination of the city’s history, geography, socio-cultural composition, and global position, and are briefly discussed below.

A prime factor encouraging a concentration of knowledge industries in Sydney relates to its commercial leadership within the Australian economy, which also has been a major factor in the city’s emergence as Australia’s principal site for global activity. By 1992, 54 of Australia’s top 100 companies were headquartered in Sydney (Newton, 1992). This commercial leadership has generated a strong demand for knowledge-intensive, advanced producer services for company headquarters such as corporate legal and accountancy services, and IT services.

Australian company head office concentration in Sydney has been reinforced by the preference of TNCs to site their Australian head offices there. This reflected Sydney’s global profile, with its Opera House and Harbour Bridge icons and warm temperate beach lifestyle, in addition to its status as the nation’s chief commercial centre with the main international airport. This TNC preference has been particularly evident in the finance sector, in which Sydney developed as Australia’s main connection with the expanding global finance system from the 1980s. In turn, the deepening and globalization of Sydney’s finance sector has generated knowledge-intensive activities, such as derivatives trading and funds management. In the 1990s, as the Asia Pacific zone emerged as a third global economic bloc, TNCs started setting up Asia Pacific headquarters in Australia, especially in Sydney. These headquarters took advantage of Sydney’s wide range of Asian language immigrants for whom the city had been the preferred Australian destination for several decades.

The last observation points to the growing significance of skilled immigration in increasing Sydney’s skills base for knowledge industries. Sydney has been the most preferred destination for recent skilled immigrants into Australia. Lifestyle and strong employment opportunities, particularly in knowledge industries, have been major reasons for this preference, along with family and ethnic ties for Asian immigrants. This immigration has strengthened the existing deep skills base in Sydney, which has arisen from the demands of its concentration of company head offices, advanced producer services, high-order finance, and media production, in particular, as well as for social reasons that include Sydney’s large, cosmopolitan cultural and entertainment environment (Florida, 2002) in addition to its climate and beach attractions. This skills base has, in turn, facilitated the development of new knowledge industries, as the example of Sydney’s multimedia industry (discussed below) demonstrates.

Several clusters of knowledge-based industries have evolved in Sydney in response to these factors. One is a financial industry cluster with a particular specialization in global finance activities. This has developed in Sydney’s traditional commercial core in the northern CBD. A closely
related cluster contains advanced producer services, particularly high-order legal, accountancy, and IT services. This is concentrated in the CBD and satellite office centers in the Lower North Shore (Figure 1). A third cluster is centered on media, especially film, video and television production, and the related advertising industry. This cluster is primarily located in the CBD and surrounding inner suburbs and in the Lower North Shore. A fourth Sydney cluster centered on tourism and mainly concentrated in central Sydney contains little advanced knowledge-based activity. Industry case studies from the second and third clusters are described below.

Since the turn of the century, however, much of Sydney’s knowledge sector has stagnated in line with the city’s overall economy. This seems to be, in part, due to higher costs of living in Sydney arising from rapid increase in house prices to historically high levels of non-affordability. This increase arose for various reasons that include the strong expansion of Sydney’s knowledge-based and other global activities in the 1990s, and planning limitations on the city’s outward expansion because of environmental concerns about air and water quality

As the above-overview suggests, the distribution of knowledge jobs within Sydney is skewed toward the concentrations of corporate head offices and their related producer services requirements. Employment in Reich’s “symbolic analysts” category of worker (those dealing with problem identification, analysis, and solving) (Reich, 1991) provides a convenient means of investigating knowledge job distribution. Data on occupations at the four-digit level for 2001 has been used to identify the distribution of symbolic analyst jobs in Sydney (Cole, 2004; Sharpe, Martinez-Fernandez & Larcombe, 2004). The data indicate that the proportion of total jobs in managerial symbolic analyst occupations is fairly even among Sydney’s sub-regions. But the proportion of professional symbolic analyst jobs in total jobs is spatially uneven across Sydney (Figure 2). In particular, the proportion of business and legal professional jobs is very concentrated in Sydney CBD and its

Figure 1. Sydney locations mentioned

![Map of Sydney locations](image-url)
satellite corporate zone in the Inner North (Lower North Shore). This reflects the concentration there of knowledge activities in corporate head offices and in advanced legal- and accountancy-related producer services. Other categories of professional symbolic analysts jobs also show centralized distributions. Professional building and engineering jobs are somewhat concentrated in the Inner North sub-region, reflecting the cluster of engineering consultancies in the North Sydney area. Technical professional jobs have their main concentration in the CBD-Airport corridor area. Jobs for arts professionals are the biggest proportion of total jobs in a wide zone that comprises central and inner Sydney.

Industry Case Studies

Information Technology and Telecommunications

As Australia’s largest and most globalized city (Daly & Pritchard 2000; New South Wales Department of State and Regional Development 2003; Searle 1996), Sydney has naturally emerged to be the focus for the nation’s ITT sector, especially with regard to higher-order functions.

As explored in Searle & Pritchard (2005), the growth of the ITT sector in Sydney is connected closely with Sydney’s aspirant global city status. The Australian economy is a significant consumer of ITT products, encouraging many multinational firms to establish regional headquarters in the city. In 2001, 157 of the 250 largest ITT companies in Australia were headquartered in New South Wales (predominantly Sydney) (Burton Taylor 2001, p. 28). These offices often undertake a range of functions including sales and marketing, management and administration, wholesaling and some assembly operations. These activities take advantage of Sydney’s multi-ethnic and multilingual employment base within a “repository of ‘Anglo-Saxon institutions’ within relative proximity to Asia” (Poon & Thompson, 2003, p. 201). Moreover, professional ITT salaries in Sydney are lower than those in global cities including London, New York, and Tokyo (SGS Economics & Planning, 2004, p. 43).

Figure 2. Share of symbolic analysts – Professionals in total employment by Sydney sub-region place of employment, 2001 (Sharpe, et al., 2004)
Questions remain, however, on the extent to which these regional headquarter activities percolate into R&D and value-added activities. A few multinationals (including Microsoft and Google) have prominently established R&D activities in Sydney. Nevertheless, doubts persist as to the whether the proliferation of multinational regional headquarters in the city translates into knowledge-based jobs growth. In a widely cited comment about the nature of the sector, in the year 2000, Graham Larcombe of the National Institute of Economic and Industry Research (NIEIR) speculated to the Australian Financial Review that many of the ITT firms in northern Sydney “are like glorified warehouses” (Menzies, 2000, p. 12). O’Connor et al. (2001, p. 161) refer to Sydney’s major ITT agglomeration, in the edge city region of North Ryde, as being dominated by administration, sales, storage, and distribution. Freestone (1996, p. 27) concludes that “the North Ryde Industrial Area is no agglomeration of closely inter-linked companies nor recognized seedbed of technological innovation.”

In Sydney, what seems to be happening is that the ITT sector per se does not appear to be a strong centre for innovation and knowledge-based employment, but the proliferation of ITT companies is providing a basis for ITT to be used as an input in an array of innovative, knowledge-based sectors. As an example of this, we now turn our attention to the multimedia sector.

Multimedia

Sydney’s multimedia industry has a number of features that are associated with the high levels of technical and creative knowledge embodied in its production (Searle & De Valence, 2005). Small firms predominate, with an average employment of eight persons per firm in 2000. This reflects several factors: the industry’s newness that has resulted from digital technology advances; relatively low industry entry costs for new firms; and the project-based nature of the industry’s work, a feature also partly associated with the industry’s immaturity and lack of standardized output. The industry’s newness and the rapid take-up of its digital products, notably Web site design, are indicated by the rate of new firm formation in the late 1990s, prior to the global dot.com crash of 2000. The 1996 Sydney Yellow Pages lists 100 firms under “Multimedia Services,” a little over one-third of the 279 firms listed for 2000 (Telstra Corporation, 1995 & 1999).

The types of activities carried out by Sydney multimedia firms are suggestive in showing how new knowledge-based creative production can be situated. In particular, the new multimedia output has commonly been produced as a new activity in graphic design companies (Searle & De Valence, 2005). This added output most frequently involves Web design, but also computer imaging/animation and film/video production and, more recently, interactive touch screen products and Internet software. Thus, for many multimedia firms, an initial graphic design base has been extended into related multimedia areas using design skills, involving employment of new staff with computer science education and/or the use of contractors and subcontractors for specialized computer, design and video services (Searle & De Valence, 2005, p. 251). By contrast, a minority of Sydney multimedia firms specialize in niche areas including audio and music applications, CD duplicating, and multimedia software development. Specialized multimedia products and services are frequently sold to other local multimedia firms to allow production of more complex outputs. Around half of Sydney’s multimedia firms in the year 2000 survey had other multimedia firms as major clients (Searle & De Valence, 2005, p. 248), suggesting the emergence of an embryonic Marshallian industrial cluster with dense input-output linkages.

Apart from this development of intra-cluster linkages, the growth of Sydney’s multimedia cluster has been aided by business generated by Sydney’s concentration of Australian media.
head offices (in television, radio, newspapers, and magazines) and the related concentration of advertising firms. Around half of the multimedia firms responding to the year 2000 survey had major clients in the advertising industry, in particular, or the printing and publishing and film/broadcasting industries. The centralized Sydney location of head offices in these industries helps shape the geographic pattern of multimedia firms, which are very concentrated in the CBD and adjacent or nearby suburbs, including the Lower North Shore area. The survey reinforced this point in finding that the main concentration of customers for multimedia firms in the sample was in the CBD and the Lower North Shore areas. Nevertheless, the rapid adoption of Web sites by all sectors of the economy in the late 1990s was indicated by the wide variety of major clients of surveyed multimedia firms that were outside the advertising/media sector.

While clients of Sydney multimedia firms are predominantly located in Sydney itself, the year 2000 survey found that more than half of the sample of multimedia firms had at least 10% of their major clients outside Sydney, a situation facilitated by broadband transmission of multimedia data. About two-thirds of these clients were in other states, and one-third were overseas. The more significant industry linkages beyond Sydney involve alliances and partnerships. One-third of the surveyed multimedia firms participated in international alliances and partnerships, and about one-half participated in alliances/partnerships within Australia. Such arrangements allow multimedia firms to engage in larger and more complex projects, to gain access to new knowledge, and to increase market access or reduce market uncertainty.

The centrality of highly skilled labor to knowledge industry development clearly is illustrated by Sydney’s multimedia industry. Of the multimedia firms surveyed in 2000, nearly three-fifths had over 15% of their staff with a design education, and a little over one-third had more than 15% of their staff with a computer science education. Firms with intermittent skilled labor needs hire contractors and subcontractors. The residential preferences of designers, programmers, and the like, thus, become a central location factor for multimedia firms. Freelance Web designers, for example, show a highly centralized residential location pattern: Sydney CBD is the most common place of residence for such designers at one Web designer employment agency (Searle & De Valence, 2005, pp. 249-250). In turn, this indicates the attraction of the buzz of the inner city café lifestyle for multimedia’s vital employees with advanced creative computing and design skills. Converted warehouse spaces in inner suburbs with large open-plan offices and high ceilings are a preferred working environment for creative IT workers, and nearby new cafes provide a relaxed locale for work meetings (Brown, 2000; Cummins, 2000a, 2000b), and inner city terrace houses and new apartments provide a supply of distinctive, low maintenance, and accessible housing. This preference for inner city living and working powerfully reinforces the centralized location pattern of multimedia firms, because proprietors prefer to live and work there, or because it makes it easier to hire and keep specialized staff that is critical to firms’ competitiveness.

In overview, the Sydney multimedia industry provides various insights into the ways in which knowledge-based industry development takes place in a large, global status city (Searle & De Valence, 2005, p. 252). First, there is some evidence for the operation of inter-firm linkages of the Marshallian industrial district type within the industry’s inner city concentration. For one-half of the firms, various critical multimedia services are provided by other multimedia firms, although most firms engage in a range of multimedia activities that provide in-house inputs. Frequent input-output linkages also exist between multimedia and graphic design firms, from which many multimedia firms have evolved. For both multimedia and graphic design firms, the advertising
industry is the most important external market, whose centralized location pattern reinforces that of multimedia firms. But a significant number of multimedia firms also operate independently outside this emerging inner city multimedia cluster that includes graphic design and advertising. This points to the operation of two urbanization economies underpinning Sydney’s multimedia industry. First, the variety of the industry’s general output linkages suggest the importance of a general metropolitan-scale demand for Internet services, especially by Sydney’s concentration of headquarters and related producer service firms. Second, a large prior and concurrent demand for computing and graphic services has generated a large pool of computer graphics talent that has stimulated and fed multimedia development. This demand has been particularly significant in Sydney because of the city’s national leadership in information and communication technology, and media industries.

**URBAN PLANNING FOR SYDNEY’S KNOWLEDGE INDUSTRIES**

The planning of Sydney’s knowledge-based industries can be considered at two discrete levels. First, to consider are issues of how metropolitan-wide planning processes have incorporated the needs of the knowledge industries. Second to consider are initiatives at specific sites to encourage knowledge-based investment. These two levels are now considered in turn.

**Metropolitan Planning**

There is general consensus that, over the course of more than two centuries, Sydney has suffered from haphazard and inadequate metropolitan planning. Incredibly, the city still does not possess an institution charged with metropolitan governance. Sydney’s planning responsibilities are shared between the state government and 48 local government authorities.

By the late 1990s, notions of equity as the guiding principle for Sydney’s metropolitan strategy had been shunted aside by those relating to the challenge of positioning Sydney’s growth within the international economy. Within this neo-liberalist planning paradigm (McGuirk 2003; McGuirk & O’Neill, 2002; Searle, 2002), the purpose of metropolitan planning became more narrowly strategic: a change captured by the concept of a movement from urban managerialism to urban entrepreneurialism. The advent of the global city concept and city league tables in the 1990s provided new policy visions for urban planners. They informed a policy imagination of urban governance in which planners provided the infrastructural base for globalized economic growth. Sydney’s urban imagination was inspired by these visions. It boomed during the 1980s and 1990s on the back of the capture of global city functions, such as business services, corporate headquarters, conferences, and urban tourism, culminating in the 2000 Olympic Games.

These contexts paved the way for the City of Cities metropolitan strategy, developed over the period 2004-05. The strategy’s aim is rooted unapologetically in the urban entrepreneurial tradition. It is “the NSW Government’s long-term plan for to maintain Sydney’s role in the global economy” (NSW Government, 2006). Given this orientation, how has the strategy interpreted the growth and future potential of knowledge-based industries in Sydney? This problem closely intersects with issues of how to plan for creativity and innovation and, this being the case, it is relevant to recall Florida’s dictum that: “[creative] environments cannot be planned from above” (in Peck 2005, p. 765). Whereas state instrumentalities can facilitate the growth of this sector (notably via planning regulations and strategic investment in enabling infrastructure such as bandwidth), the rise of knowledge-based precincts has a strongly
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organic component, resting on the ways that companies, ideas, and spatial dependencies come together to create “sticky places” (Markusen, 1996).

To view how the City of Cities strategy deals with these issues, it is necessary to focus specifically on the planning document titled “Economy and Employment,” one of 10 thematic papers that comprised the final report of the strategy. The document talks extensively of the merits of clustering but is notably quiescent in terms of grounding this concept in anything more than generalized discourse. “Economy and Employment” mentions the word cluster 34 times in 42 pages, mainly in two contexts. First is the use of this word in an abstracted way, viz:

Sydney has the advantage of industry clusters in emerging fields, notably information and communications technologies and other digital technologies, especially the multimedia, creative industries, biomedical and pharmaceuticals, nanotechnology and energy—efficient technologies (NSW Government, 2005, p. 44).

Second, the concept of clustering is discussed in relation to what is labeled “Initiative A2.2,” which is specified as “strengthening industry clusters.” A reading of this initiative, however, reveals what can be considered a half-hearted embrace of the concept:

The importance of clustering of industries and access to creative skills to business and regional competitiveness has been reinforced by business commentators such as Michael Porter (1998) and Richard Florida (2000). Establishing magnet infrastructure which attracts activities to a location is a way of building cluster strengths, and can enable a centre to distinguish itself from other centres. Where State Government funding is involved, decisions on the location of magnet infrastructure should be aligned with the State Infrastructure Strategy. To choose the right magnet infrastructure, or act to strengthen particular aspects of clusters, detailed information is required on local industries and their competitiveness and international performance in terms of exports... In addition to the State level analysis, there is a need for much better information about localized clusters of business activity, and how these might be strengthened (NSW Government 2005, p. 69).

This absence of firmer planning principles within metropolitan-scale initiatives, thus, brings into focus a collection of place-specific planning initiatives made over recent decades.

Specific Initiatives

Urban planning for Sydney’s knowledge industries started over 40 years ago, but has been piecemeal and sporadic in the interim. The first such planning occurred with the rezoning in 1964 by the state government of 145 hectares of green belt land adjacent to the proposed Macquarie University at North Ryde for advanced technology-based industrial development (Freestone, 1996). This was intended to emulate high-tech development in Silicon Valley, with research at Macquarie University providing the innovative technology base for new companies. In the following year, 1965, the government instituted controls over site coverage, setbacks, parking, and landscaping that generated a high environmental quality in keeping with an advanced technology image (Freestone, 1996, p. 23). In 1972, effective planning control passed to Ryde Council, which reinforced the science park concept with development controls over the site area, floor space ratio, and storage, and continued to exclude general industry. The floor space ratio of 1:1 and site coverage controls ensured that development would be low-density, generating a campus-like environment. However, a subsequent ruling by the Land and Environment Court that computer data processing qualified as research-based activity opened the door to of-
office development in the predominant Industrial Special (University) zone.

As a result of the positive amenity generated by the controls and the availability of sites for freestanding offices in a professional-managerial white collar area outside the high cost CBD and North Sydney centers, the North Ryde industrial area became the most important headquarters precinct in Sydney outside those centers. The hoped-for research-dominated development had not occurred. About 45% of enterprises in 1994 had no links with Macquarie University, and where there were links, these were mostly informal (Freestone, 1996). While the area now has a large number of technology firms, these are predominantly centered on administration, sales, storage, and distribution of products developed and made elsewhere. In the last decade, Macquarie University has developed a small science park on potential research links to the university as well as employment for the university’s graduates.

In the early 1980s, the state government developed a program to attract investment in advanced technology development to Sydney. As part of the program, a government-initiated advanced technology park, Australia Centre, was opened in 1987 on surplus government abattoir land at Homebush Bay on the fringe of western Sydney (Searle, 2002). Development and management of the park was contracted out to developers Lend Lease. The company quickly assessed that technology-related development was likely to be slow. It successfully lobbied to extend the zoning to allow freestanding offices. This, plus the low location rating of the area compared to the North Shore for advanced technology firms, and the generally subdued state of Australia’s advanced technology manufacturing sector, stifled significant high-tech production in the centre, although AWA built a silicon chip plant there. The Policy Branch of the Department of Environment and Planning pushed within government for a state-owned site adjacent to the Werrington University campus to become an advanced technology zone where university research would be used by industry, but nothing came of the proposal.

The advanced technology park strategy was a globally fashionable policy that, in practice, required specific local factors to have a chance of success. Most of these factors were absent in western Sydney—a highly skilled labor pool, a strong research source, a high amenity image, and start-up facilities for new companies, among others. The zoning and management models were also flawed, with Lend Lease Understandably opting for immediate returns by attracting free-standing offices to one of only two zones in Sydney that allowed these without ancillary industrial uses.

A more successful initiative started in 1990, when the three inner Sydney universities developed a proposal for an advanced technology park on 13.8ha of surplus state railway land at Eveleigh near Redfern and the CBD (Forgan, 1996). The park would draw, in particular, on research from the three universities and house firms that would develop this research to prototype production; as well, the park would provide technology-related training. The proposal was accepted by the state government. The Australian Technology Park (ATP) was eventually signed off in 1994 with Federal Better Cities program funding of $11.7m, state government funding of $22m and a 99 year lease over the site (Richardson, 1995). The state funds were used to develop an incubator centre for new research-based enterprises, with shared support infrastructure and services, and business mentoring.

The ATP now has over 1000 jobs and 104 park tenants (including 34 virtual offices for micro industries), with about one-quarter of total potential floor space having been developed (Swat, 2006). Information and communication technology tenants occupy 80% of the ATP’s existing net rentable floor area. There also are significant numbers of tenants in the life sciences, biomedical, and...
virtual reality areas. This technology base has not yet produced significant intra-park synergies. Only 10% of businesses in a 2006 survey had collaborative programs with other tenants at the ATP (Swat, 2006). Furthermore, the ATP is now starting to take major non-technology firms as part of a strategy by the government agency controlling the ATP site (now the Redfern-Waterloo Authority) to increase the rate of development and attract more commercial support services to the park. Despite this, the ATP can be considered to have been reasonably successful in generating a cluster of advanced technology firms, even if the spin-offs from university research have so far been limited. Among the reasons for this outcome are the public influence and research expertise of the three inner area universities, especially in getting the ATP off the ground; the central location of the Eveleigh location for technology companies and staff; and the significant government funding put into the ATP.

In 1995, planning for a major knowledge-based development in the cultural sector was opportunistically set in train by the state government. Fox Studios approached the NSW and the Victorian governments for support for its first studios outside the US. The NSW government offered a lease of the old Sydney Showgrounds site in inner eastern Sydney, which had become available with the rebuilding of Royal Sydney Show facilities at Homebush Bay to accommodate events for the year 2000 Olympic Games. The deal was supported by the federal Labor government, which contributed $A32m as part of a cultural economy initiative. Fox agreed to set up the studios on the Showgrounds site after the state government set the site rental at a low level, carried out site remediation, and approved a Fox family entertainment complex as well as film studios on the site. The Auditor-General found that the effective state subsidy to Fox amounted to between $85m and $107m in present value terms (NSW Auditor-General, 1997). The enthusiasm of the state for the Fox proposal was based on an assessment that it would attract a large-scale film industry to New South Wales and create or retain 1,200 film industry jobs (NSW Auditor-General, 1997, p. 114). A number of major international movies have been made at the studios, as well as features for television and local release. The site has attracted a range of specialist production support companies (relocated from elsewhere in Sydney, rather than newly established, in most cases).

Suggestions for more effective planning for Sydney’s knowledge industries are made in the conclusion.

CONCLUSION

As this analysis suggests, planning for knowledge-based industries in Sydney has been sporadic and ad hoc. The new Sydney metropolitan strategy proposes action to facilitate development around research hubs (NSW Government, 2005), but this will require resources that previously have been difficult to find (a similar initiative was proposed in the 1988 strategy without result). What has been lacking is more comprehensive and integrated planning such as that in Victoria and Queensland, with their information technology, biotechnology and multimedia industry strategies, and complementary planning policies centered on Melbourne and urban South East Queensland. Several reasons for this can be suggested. The most obvious is that Sydney’s market strength in workers has allowed the state government to give spending priority to higher priority areas for the electorate, notably health, education, and crime. Rapid economic development in Sydney in the 1990s allowed the government to become somewhat complacent about industry development. The ineffective performance of the Department of State and Regional Development arising from lack of experienced staff was noted by an informed commentator (Roberts, 1998). Associated with this is the belief of the state Premier from 1995
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to 2005, Mr. Carr, that latent air and water pollution issues meant that the Sydney Basin was essentially full, and that extra development was, therefore, problematic to some degree. The strong neo-liberal ideology pursued by NSW governments since 1988 also has played a part, with its emphasis on avoiding budget deficits to retain a AAA business rating, though the other state governments adopted a similar ideology.

Planning for high-standard cultural and natural environments to attract knowledge workers, Richard Florida (2002), has been rather incidental to other planning goals. The 2005 City of Cities metropolitan strategy (NSW Government, 2005) sees initiatives to protect the city’s natural environment as enhancing livability and attracting international investment. Planning at more local levels could be argued to have done little to promote the Bohemian, mixed environments that Florida sees as attracting creative workers. The state government’s urban consolidation policy has been strongly pursued over the last 15 years, and this has resulted in the destruction of parts of older inner city precincts with low-cost space for creative firms, art galleries, and the like. On the other hand, the demand for new inner city apartments by Generation X, in particular, has led to more street activity and new cafes, restaurants, home décor outlets, and nightclubs that might attract a range of knowledge workers. In the old industrial areas, such as Pyrmont to the west of Darling Harbour, new apartment development has generated a homogeneous landscape of undistinguished high-rise development that is the antithesis of Florida’s Bohemia, but which has been filled with CBD knowledge workers who enjoy the harbor views and the proximity to city amenities.

Sydney’s strength in knowledge-based industries, despite the paucity of good industry planning, demonstrates the importance of market forces and inherent local factors for knowledge industry development. It seems to us that the propellant for the emergence of knowledge-based industries in Sydney has a lot more to do with the amenity qualities of the city—that provide an attractive context for higher-order business services and high-human capital individuals—than any planned responses to the opportunities of a global knowledge-based economy. These insights echo comparable analysis of “why Silicon Valley?” by Markusen (1996) which points to the contingencies of place as key explanatory vehicles to how and why knowledge industries settle in particular sites.

The extent to which localization economies have developed in Sydney’s knowledge sector to reinforce the city’s place-based advantages is a question for further research. While it seems clear that the agglomeration advantages arising from large pools of skilled labor and from the concentration of corporate head offices have been significant across the sector, relatively little is known of the extent to which these advantages are supplemented by localization economies. The multimedia case study described here suggests these economies have played some role in the development of that industry in Sydney, while the information technology industries case study suggests low-level localization economies may be important there.

Given this knowledge gap, the question of what spatial planning can do to improve development of Sydney’s knowledge industries is not easy to answer. What does seem apparent is that planning needs to be tailored to the different information environments of the various knowledge industries. In information technology industries, international evidence (such as Coe, 1998; Cooke, Uranga and Etxebarria, 1998; Gordon and Kimball, 1987; Gordon and McCann, 2000; Saxenian, 1994) suggests that significant IT industry complexes have a sub-regional or regional scale. Planning for these industries should, therefore, at least ensure a variety of sites and accommodations across Sydney in accordance
with market demands, from converted inner city warehouses to new offices in high amenity areas along the Springfield, outer Brisbane model. More detailed initiatives require further data on activity and knowledge linkages in Sydney IT industries. In contrast, knowledge industries in high-order finance remain concentrated in traditional central city precincts, and the planning task here is to ensure adequate CBD supplies of good quality office space and supporting infrastructure, especially excellent telecommunications and public transport. Last, to stimulate creative industries, such as film and television production, international spatial planning is now promoting the concept of cultural quarters, suitably branded and physically denoted and preferably retaining adequate supplies of low-cost accommodation for small creative firms. This planning focus recognizes the centrality of localized tacit knowledge for cultural industries. Low-cost premises in suitably stimulating environments are potentially critical for small creative firms. There is an opportunity for Sydney’s planning to foster a creative industries quarter in the inner city zone between Redfern and Pyrmont by slowing redevelopment of existing older commercial spaces (and thus keeping lower-cost accommodation and the associated creative ambience), using planning controls, re-use of public buildings, and the like. The area has significant creative industry drivers, such as four television network headquarters and studios and an existing concentration of multimedia and other creative industries.

At the same time, the trade-offs involved in spatial planning for knowledge industries must be faced. Planning to build on Sydney’s high-wage skilled labor base risks further marginalizing the less skilled, especially via the impact on housing costs and furthering the city’s socio-spatial polarization. As already noted, Sydney’s 80s and 90s boom in knowledge-based global activities contributed significantly to rapid increases in housing prices. In response, training resources to provide marketable skills to lower income groups needs to be increased. And some of the city’s knowledge dividend needs to go to increasing low-income housing supply and public transport, and other social goods in the suburbs left behind in the knowledge industry race.

In Sydney, national commercial leadership and a global profile has combined with a fortunate geography to generate an economy in which its knowledge industries are central. But economic pre-eminence is never guaranteed, and the challenge for Sydney is take active steps to ensure that its best qualities for knowledge activities are safeguarded, and that its deficiencies and limitations are actively addressed by planning and mobilization of the necessary resources.

**FUTURE RESEARCH DIRECTIONS**

The findings of this chapter suggest two significant directions for future research. The first concerns the way in which knowledge industry clusters work in places like Sydney that are peripheral in global chains of production. This is particularly important in IT-related industries, where understanding of the operations of the main global production centers is not matched by equivalent understanding of how value-adding happens down the production chain in major sites of consumption such as Sydney. Research questions that need to be answered for such understanding include the role of national policies in helping or hindering IT industry growth, the significance of local research institutions in later stages of the production chain, and the interaction between national economic structure and the structure and operations of IT industries (in Sydney’s case, this would include the implications of a national economy that has a high dependence on resource exports). Similar understanding is needed for high-order finance and other advanced producer
service industries, where there has been much less research on localization economies even for global centers of these industries. For creative industries, there are additional research questions, such as the extent to which such industries can grow outside low-cost accommodation located in creative environments.

More generally, research might investigate whether the whole idea of localized knowledge industry clusters is a paradigm that needs to be revised. Does the globalization of production chains and the importance of distant sources of expert knowledge and markets mean that the significance of local intra-cluster linkages and information exchanges declines as functional distance from global innovation centers increases, leading to non-core clusters that are geographically concentrated because of agglomerations of customers and skilled/creative labor? Conversely, what are the threshold conditions required to make a local knowledge industry cluster into a global core? Related to this, what are the implications of Florida’s creative class hypothesis for the cluster paradigm?

The second significant research direction from this chapter concerns what spatial planning can do to promote knowledge-based urban industries. To a large degree, this requires answers to the above research questions. But research also is needed on specific potential planning approaches. One of these relates to the preservation of older buildings to give cheap accommodation and a stimulating ambience to new creative firms. How effective is such a policy in generating knowledge industry development, and what are the best tools to achieve this? Another set of issues relates to the standard planning approach of innovation parks. What conditions differentiate successful and unsuccessful innovation parks? How can this information be used to improve innovation park approaches? Or is the innovation park/precinct idea now dated?

ACKNOWLEDGMENT

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Chapter XII
Urban Competitiveness in the Knowledge Economy:
Evolution Paths of the Portuguese Metropolises

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ABSTRACT

The chapter focuses on the growing territorial imbalances between urban regions in the light of the sometimes painful transition toward a knowledge-based economy. Drawing from the vast literature on urban competitiveness, it develops an integrative framework to assess and compare urban regions’ performance and assets in the emerging knowledge-based economy. In a second stage, the framework is applied to the Portuguese metropolis of Porto and Lisbon in order to illustrate how the current tendency toward de-industrialisation and knowledge-based development affects different types of cities. Using the framework concepts, the chapter concludes with policy recommendations to support national and urban policy makers toward urban competitiveness enhancement for our cases, whose rationales may constitute lessons to other similar contexts.

INTRODUCTION

Within developed countries, territorial economic disparities are highly significant and persistent. In many countries, the spatial disparities have even increased in the last decade, reflecting that some types of regions are evidently better prepared and equipped than others to benefit from changing economic circumstances. In fact, there are signs that globalisation and the shift toward
a knowledge-based economy has reinforced the role of some metropolis as core engines of economic growth and innovation, but left others in relative decline.

Manufacturing cities in the southern fringe of the EU (Portugal Spain, Italy, and Greece) are facing a painful restructuring process. In the 1980s, they enjoyed strong location advantages due to low wage levels, a stabilising macro-economic and institutional environment, and improved access to markets in an enlarged EU. Many larger cities in these countries experienced a massive inflow of manufacturing plants and also enjoyed indigenous growth of their traditional manufacturing industries. Unemployment rates dropped, and incomes and productivity increased sharply. However, at the turn of the century, many of the advantages have vanished, namely related with the emergence of new manufacturing locations in Asia and Eastern Europe, leading to a loss of blue collar jobs and lower levels of inward investment.

Indeed, the decline of manufacturing sectors and the shift toward a more knowledge-based economy is not spatially neutral. Although it is certainly not a zero-sum game, there are indications that some cities benefit while others lose. Capital cities, like London, Madrid, or Stockholm, are in a good position: they capitalise on their traditional strengths in sectors that enjoy healthy growth in a knowledge-based economy, such as the financial sector, business services, and research and development activities. Declining industries, such as traditional manufacturing, only make up a tiny part of the economic structure. Furthermore, capital regions tend to be better endowed with locational factors that help to attract and retain human capital: cultural facilities, a diverse labour market, and global connections through their international airports. Some other cities, like Rotterdam, Dortmund, or Sheffield, are less well-positioned to benefit from this shift, namely, cities with an outdated manufacturing base due to their unfavourable sector structure, tend to have relatively large problems of unemployment and social exclusion. Attracting and retaining talent (highly skilled) is a problem, as they tend to suffer from negative image perceptions related with pollution, crime, less cultural amenities than capital cities, and they have a relatively poor quality housing stock (former working class neighbourhoods). Furthermore, regional support from the EU is likely to diminish in the near future.

This chapter focuses on the growing territorial imbalances in Portugal, in the light of the painful transition toward a knowledge-based economy. It compares the competitive performance of Porto and Lisbon over the last 10 years. To do this, we draw from the vast literature on urban competitiveness to develop an integrative framework to assess and compare urban competitiveness in the emerging knowledge-based economy. Second, we apply it to Porto and Lisbon to illustrate how the current tendency toward de-industrialisation and knowledge-based development affects different types of cities.

For the analysis we have collected a variety of relevant data on both urban regions. Additionally, we have collected circumstantial evidence, through a large number of expert interviews with company executives, policy makers, and other relevant actors at the local and regional/national level.

The analysis distinguishes itself in at least two respects. First, instead of focusing on a specific aspect of the urban knowledge economy, we take an integrative approach, linking many aspects to one another in a comprehensive framework. Second, we analyze different types of cities in terms of size, economic base, and place in the national urban grid to highlight the substantial differences in the way cities are affected by the transition toward a knowledge-based economy.
BACKGROUND: CONCEPTS AND ISSUES

What determines the competitiveness of urban regions? One of the questions in regional and urban economics is whether the concept of competitiveness can meaningfully be applied beyond individual firms to geographical areas. Some argue it cannot: “the competitiveness of nations is nothing more than an appropriate aggregate of the competitiveness of the firms they contain” (Georghiou and Metcalfe, 1993). And, non-competitive businesses can become insolvent, but the same cannot be said of countries or cities (Krugman, 1997).

Nevertheless, the competitiveness concept is frequently applied to cities and regions. For one thing, the aggregate competitive performance of firms can be explained by differences in place-specific assets. For another, cities increasingly behave in the logic of competition: they compete to attract companies, people, tourists, big events, investments, and resources.

Competitiveness can be measured using indicators such as per capita income, productivity, or unemployment rates. Such indicators are highly instructive to describe the performance and compare regions, but they do not reveal the roots and causes of the differences. It, therefore, is crucial to make the distinction between sources of urban competitiveness on the one hand, and outcomes of competitiveness on the other (Deas & Giordano, 2001).

In our framework of analysis, adapted from van Winden et al. (2007) and van Winden (2006), competitive performance is reflected in the development of the productivity of the business sector and the development of human capital in the city/urban region. The development of the human capital stock is defined as the development of the educational attainment of the existing population, and the immigration of higher-educated workers. The competitive performance of the business sector is reflected in the productivity increases and expansion of existing firms, the number of start-up firms, and the degree to which the urban region

Figure 1. Urban competitiveness: sources and performance (adapted from van Winden et al., 2007; van Winden, 2006)
has attracted companies from outside. As an approximate indicator for the competitive outcome, we use GDP per capita levels (at purchasing power parities). Although there are some disadvantages to using this indicator, at least comparable data is available.

As sources of urban competitiveness, we identify structural assets and governance.

**Structural Assets**

Structural assets are the core determinants of urban competitiveness, and they change only slowly.

The first, and perhaps most important structural asset, is the *urban knowledge base*, which consists of the knowledge infrastructure and the skills of the working population. The knowledge infrastructure comprises the universities, polytechnics, and other public and private research institutions. Several studies suggest that there is a strong link between the knowledge base and urban competitiveness, namely reflected in economic growth and productivity increases (Mathiessen et al., 2002; Glaeser et al., 1995; Simon, 1998). The development toward a knowledge-based economy increases the potential economic value of the urban knowledge infrastructure. However, as the interaction between universities and the business sector is far from optimal, in many cities this potential remains largely unused.

The second asset that deeply affects urban competitiveness is the *industry structure*. Cities with a weak industry structure (i.e., specialized in declining or non-innovative sectors) have many interrelated problems (Cheshire & Gordon, 1995), related with economic dynamics, quality of life, image, housing stock, safety. Compared to regions with a healthier economic base, this makes it extremely difficult to retain or attract knowledge workers or knowledge-intensive companies. These structural factors are hard to change over time, although some cities, such as Manchester or Bilbao, have managed remarkably well. The degree of firm’s innovativeness also plays a crucial role (regardless of the sector to which they belong), as well as their dimension (large multinationals usually are important assets for a region, as initiators and organisers of innovation together with small and medium firms—SME).

The third structural asset is *quality of life*. This is a key determinant to attract and retain knowledge workers and firms. In Western cities, the urban knowledge economy thrives on talented people who create new knowledge and ideas. Florida (2000) puts it as follows: “...talent tends to attract talent” (Florida, 2000, p. 15). Attributes of quality of life are the built environment, attractive city parks, access to natural surrounding, a rich variety of cultural institutions, cafes, restaurants, but also amenities such as high quality healthcare and education. Some amenities are provided by the market, but in most countries the public sector plays a key role too.

The fourth structural asset is *accessibility*. External accessibility (through international airports or high-speed train connections) is crucial for urban competitiveness as it provides physical access to the world market and enables firms to maintain international networks. Simmie (2002) argues that international contacts and networks conducted by face-to-face contacts facilitated by international hub airports are critical factors for international knowledge transfer. Successful cities manage to combine both rich, local knowledge spill-overs and international best practice in the design and specification of innovations.

A fifth structural asset for urban competitiveness is *diversity*. Urban diversity promotes creativity (Jacobs, 1969). The diversity of inhabitants and types of economic actors facilitates
the interactions that generate new ideas. Florida (2000) regards diversity as a measure of the degree of system openness. The places that attract diverse groups of people (by ethnicity, nationality, gender and sexual orientation) can be said to have an environment that is easy to plug into and have low entry barriers for talent. Several empirical studies found that diversity fosters growth in cities (Glaeser et al., 1995), or at least in their most innovative sectors.

It is thus clear that urban assets are the result of historical processes and the outcome of market forces and public interventions on several scales. A crucial question concerns the role of policy and collective action in improving the urban asset base. This brings us to the role of urban governance.

**Governance**

Stoker (1995) states that governance is about the capacity to get things done in the face of complexity, conflict, and social change. Here, social capital and cultural “soft” factors play a relevant role. In urban studies it generally is recognized that urban/metropolitan governance is an important factor behind competitiveness. Among other things, adequate governance structures and institutions help to improve the asset base, to increase the utilization of the asset base and to mobilize resources. Here, we discuss three important aspects of metropolitan governance.

A first key aspect of governance is the degree of policy integration. Metropolis are receivers of a plethora of policies from a number of bodies. These policies affect the urban assets that determine competitiveness. In many cases, national, provincial, and local policies are poorly co-ordinated: policies may be fragmented, overlapping, or worse, conflicting, and producing perverse outcomes. In this light, it is reasonable to assume that a higher level of policy integration will positively affect urban competitiveness. One may distinguish between three types of policy integration: sectoral, horizontal, and vertical. Sectoral integration relates to the coordination of policy fields and sectors: economic policy, transport policy, spatial planning, housing policy, and so forth. The relevance of sectoral integration for metropolis is self-evident, but, in practice, very difficult to realise. Horizontal integration refers to the alignment of policies between authorities in a metropolis. The need for this type of integration has increased with the expansion of cities. Most metropolises are functional economic units but are governed by many municipalities, leading to unfruitful competition and foregone opportunities of resource sharing and coordination. Vertical integration, finally, concerns the coordination between different layers of government—national, regional, and local.

A second governance aspect for competitiveness is the adequacy of structures for interaction between research, education, business, and start-up support. It is now common wisdom that the economic performance of an area is positively related to the degree of alignment and cooperation between research, education, and business. One of the crucial challenges for any city is to promote this type of interaction, in order to (1) enhance knowledge transfer, with a positive impact on innovation; (2) increase the quality, the relevance, and the economic returns of academic research, and (3) improve the match between labour demand and supply. The institutional support for entrepreneurship is an important governance aspect. Van den Berg et al. (2001), in a study on growth clusters, found several types of starters support policy, both in terms of support infrastructures and soft incentives.

The third governance aspect is public private cooperation, through which urban governments may tap resources and skills from other organizations in order to gain strength, creativity, and resources. Public private partnerships can be applied in a number of domains, namely infrastructure, design, and implementation of economic development and city marketing policies (van den Berg et al., 2003). The key challenge for urban
management is to mobilize these resources and deal with the business community in new ways.

Evidently, the competitiveness of an urban region is not solely determined by the factors and actors from within that area. External conditions play a role as well, such as macro-economic conditions and policies, demographics and immigration policies, and a number of national sectoral policies that affect cities. However, this analysis is restricted to one country only, necessarily restricting the analysis.

**LISBON AND PORTO COMPARED**

**Structural Data**

Porto and Lisbon are the two main Portuguese cities and their metropolises acknowledged as the principal competitiveness poles and international centers of the country.

Table 1 presents some indication of their national position and relevance, depicting their structural differences and positions in the Portuguese urban system.

Lisbon, located in the south-western fringe of Portugal, is the capital city and the country’s largest economic and population pole, with roughly 2.6 million inhabitants in the metropolis. It has been during the centuries the most relevant economic, political, and cultural pole of the country. Path dependent, today it concentrates the main decision centres, financial institutions, and government agencies. Its economic base is much diversified, but with an important concentration of high-level services, such as financial and business services, education, and R&D. Lisbon is the core city and clearly dominates the metropolis, although important infrastructures, like science parks, concentrate in the immediate surroundings. Manufacturing represents a small part of its economic structure, although the most technologically intensive plants locate near the city.

Porto is historically the economic heart of the Portuguese north-western region, an economical and geographically diffuse urban region. The metropolis counts 1.2 million inhabitants. Industrial activities developed in a late stage compared to other European cities (middle of the 19th century) and the entrepreneurship culture has been a symbol of the city through the centuries. During the 1970s, the city of Porto entered into a “deindustrialization process,” and the tertiary sector grew strongly, namely services to the (exporting) firms needs in the broader region. Services today make up the largest share of employment and added value in the urban region. However, the cities’ industrial tradition still is highly noticeable in the urban region and surroundings. The larger region around the metropolis concentrates relevant industrial districts, namely of textiles, shoes, metal, and furniture, which today is fac-

<table>
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<tr>
<th>Indicator</th>
<th>Lisbon (% of Total)</th>
<th>Porto (% of Total)</th>
<th>Total Metropolises (% of Total)</th>
<th>Year</th>
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<tbody>
<tr>
<td>Population</td>
<td>26</td>
<td>12</td>
<td>38</td>
<td>2003</td>
</tr>
<tr>
<td>GDP, current prices (10^3 euros)</td>
<td>37</td>
<td>12</td>
<td>50</td>
<td>2003</td>
</tr>
<tr>
<td>Employment</td>
<td>28</td>
<td>12</td>
<td>40</td>
<td>2003</td>
</tr>
<tr>
<td>500 Large Firms</td>
<td>98</td>
<td>27</td>
<td>124</td>
<td>2001</td>
</tr>
<tr>
<td>Location Coefficient – industry</td>
<td>0.57</td>
<td>1.07</td>
<td>-</td>
<td>2003</td>
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<tr>
<td>Location Coefficient - services</td>
<td>1.31</td>
<td>1.1</td>
<td>-</td>
<td>2003</td>
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Note: Location coefficient is an indicator of concentration, which compares the share of a certain sector in a certain geographical area with the share of that sector in the whole country. In the example above, it was calculated using employment as analysis variable.
ing a tough process of structural change and employment losts.

**Competitive Outcomes: Facts and Figures**

During the 1990s, the Portuguese economy converged toward the European Union (EU) gross domestic product (GDP) per head levels. However, in the first years of the 21st century the catching up process came to a halt.

The two main Portuguese metropolises show strong differences in their performance. Lisbon has higher GDP per head levels than the Porto region, and the gap between the two clearly has widened since 1995 (Figure 2). Concerning the labour productivity there is a big and widening gap. Lisbon has significantly higher added value.

**Figure 2. Gross domestic product per head, 1995-2003, 1000 euros, current prices (INE, 2004)**

**Figure 3. Labour Productivity, 1995-2004, 1000 euros, constant prices of 1995 (INE, 2004)**
per employee compared with Porto (Figure 3). Figueiredo and Bessa (2004) find that this gap is much wider in industrial, catering, transports, and communication activities than in services to firms and financial services. This situation points toward the existence of a certain duality, where sectors with low added value and extensive employment coexist with highly productive sectors per unit of work.

Lisbon also has traditionally been more successful in attracting foreign companies, and also in this respect, the gap between Lisbon and Porto is widening. Figure 4 shows the share of both regions in Foreign Direct Investment (FDI) inflows. By 2001, Lisbon attracted almost all Portuguese FDI.

The capital, Lisbon, has been a magnet not only for attracting new businesses in diverse sectors (it has the strongest concentration of FDI multinationals in the country and technologically based start ups) and events (cultural events, meetings, significant presence of creative industries), but also, consequently, for highly qualified workers and human capital.

Porto, on the other hand, has been having difficulty attracting and retaining qualified staff, namely due to the poor economic conditions and an increasing competition from other urban regions. There is a tendency for skilled people to relocate to more economically attractive urban regions. Some important and mainly Portuguese-owned economic groups in the Porto Region still are large employers, and tend to contribute to the retention of qualified work in the area, although this capacity is concentrated in very few large and internationalised groups, like SONAE (several sectors), UNICER (beverages) or EFACEC (electronic machinery). Those employers, in fact, are crucial for the metropolis, considering that the indigenous employment creation and entrepreneurship, though rising, is low compared to similar-size European cities. Also, it has difficulties in attracting new businesses from outside, coexisting with delocalization of traditional manufacturing plants toward lower-cost locations (like textiles or automotive components). Despite recent trends in the shift of the economic model toward more knowledge-intensive manufacturing (new sectors—like health and ICT—and the evolution of traditional ones toward niche segments—like shoes), it does not appear to be yet enough to retain the skills and competences increasingly produced in the University of Porto.

Figure 4. Share of Foreign Direct Investment Fluxes in the Portuguese metropolises, 1996-2001, (%) (Marques, 2004)
Moreover, and also contributing to the “brain leakage,” there is evidence that Porto is losing advanced services to Lisbon, in particular, financial and advanced business services (namely due to the attractiveness to multinational firms). Using a shift-share analysis, Delgado et al. (2004) acknowledged a strong competition with Lisbon for top services, following the (stronger) economic base, but also from some smaller cities in the vicinity of metropolis of Porto, for some support services to firms (like accountants, lawyers, …). Those combined trends are threatening its centrality and endangering its economic service base.

Looking at the outputs, how can the widening urban competitiveness and attractiveness gaps between both metropolises, Porto and Lisbon, be explained?

**Structural Assets**

**Knowledge Base**

Although underperforming compared to European benchmarks, the evolution of the knowledge base in Portugal, as a whole, has been quite strong during the last decade. In this context, both metropolises are endowed with large universities and polytechnics, covering practically all knowledge fields. Although Lisbon counts three very important Universities (Nova, Técnica and Lisboa), the University of Porto is the largest, with more than 25,000 students and 15 faculties.

Table 2 depicts the evolution of R&D spending in Portugal, Lisbon, and Porto, divided by public and private sector. Both urban regions have important and internationally recognized R&D institutes, and new relevant knowledge has been created, although the R&D critical mass is much stronger in Lisbon.

In the period 1995-2001, a positive evolution is visible (an almost twofold increase), in all the sectors considered. In Portugal, compared to the EU, a large share of R&D is carried out by the institutional sector (government, higher education institutes, and non-profit organisations), leaving the private sector with a relatively modest share. This suggests a poor link between R&D efforts and the industrial and productive base. In Lisbon, the share (36%) of private R&D is significantly higher than in Porto (27%), and also, R&D spending in Lisbon has grown much faster than in Porto.

Porto’s poor performance in R&D spending is related to the dominance of traditional manufacturing sectors, with little history of R&D efforts. In Porto, higher education institutions clearly are the largest beneficiaries and execut-

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<td></td>
<td>10^6 € %</td>
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<td>10^6 € %</td>
<td>10^6 € %</td>
<td>10^6 € %</td>
</tr>
<tr>
<td>Firms*</td>
<td>96.2 21</td>
<td>330.3 32</td>
<td>48.3 19</td>
<td>215.0 36</td>
<td>13.5 22</td>
<td>34.5 27</td>
</tr>
<tr>
<td>Institutions</td>
<td>364.6 79</td>
<td>708.1 68</td>
<td>209.9 81</td>
<td>380.7 64</td>
<td>49.1 78</td>
<td>94.1 73</td>
</tr>
<tr>
<td>Government</td>
<td>124.3 27</td>
<td>215.5 21</td>
<td>99.2 38</td>
<td>178.7 30</td>
<td>4.7 8</td>
<td>7.3 6</td>
</tr>
<tr>
<td>High Education</td>
<td>170.4 37</td>
<td>380.6 37</td>
<td>73.1 28</td>
<td>156.9 26</td>
<td>28.5 46</td>
<td>52.5 41</td>
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<tr>
<td>Private Non-Profit</td>
<td>69.9 15</td>
<td>112.0 11</td>
<td>37.6 15</td>
<td>45.2 8</td>
<td>15.8 25</td>
<td>34.3 27</td>
</tr>
<tr>
<td>Total</td>
<td>460.0 100</td>
<td>1038.4 100</td>
<td>258.2 100</td>
<td>595.7 100</td>
<td>62.6 100</td>
<td>128.6 100</td>
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*Note: Values in current prices; Porto and Lisbon—metropolises*
ers of R&D, followed by the non-profit private institutions (reflecting the presence of important University-Firm interfaces and brokers). In the period 1995-2001, the scientific output of Porto’s science institutes has risen strongly in terms of academic publications (mainly in engineering and health sciences), although, as it will be seen, the application and commercialization of the new knowledge has been poor.

**Economic and Industrial Base**

Both urban regions present clearly diversified economic structures, typical of metropolises. Table 3a shows the shares of the primary, secondary, and tertiary sectors in both cities, as well the absolute size of the sectors in both regions.

Table 3a shows that the share of the secondary sector (manufacturing) in Gross Value Added and employment is much higher in Porto than in Lisbon. In absolute terms, however, Lisbon has more manufacturing jobs. Also, productivity in Lisbon (measured as value added per worker) is much higher than in Porto (Table 3b). In manufacturing, the gap is especially high: Lisbon’s productivity is 150% the level of Porto. Lisbon concentrates the most qualified industrial sectors of the country, namely automotive, electronic, and pharmaceutical industries.

The economic base of Porto also is quite diverse, but there is a stronger presence of traditional sectors (e.g., basic metallurgy and textiles). In the context of the knowledge economy, this does not appear to be an advantage to the extent that this sector mix is less likely to produce new combinations and innovations. Porto’s service industry is weak compared to Lisbon, and is not completely proportional to its scale of 1.3 inhabitants.

Moreover, the urban region suffers from relocation trends both from the traditional sectors (toward cheaper employment locations) and from the high, added value services (telecommunications, creative industries, software), that look for the largest European cities where the most important headquarters are located. Relocations of foreign investment to other locations and the lost of mass production advantage in the broader region (including industrial districts) in traditional

**Table 3a. Gross added value and employment in the Metropolises, 2003 (INE, 2004b)**

<table>
<thead>
<tr>
<th>Metropolises</th>
<th>Gross Added Value/ Employment</th>
<th>%</th>
<th>10^6 euros/thousands of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Lisbon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Added Value</td>
<td>0,8</td>
<td>17,7</td>
<td>81,5</td>
</tr>
<tr>
<td>Employment</td>
<td>0,9</td>
<td>16,9</td>
<td>82,3</td>
</tr>
<tr>
<td>Porto</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Added Value</td>
<td>1,0</td>
<td>25,9</td>
<td>73,1</td>
</tr>
<tr>
<td>Employment</td>
<td>1,3</td>
<td>24,0</td>
<td>74,7</td>
</tr>
</tbody>
</table>

**Table 3b. Productivity in the Metropolises, 2003 (INE, 2004b)**

<table>
<thead>
<tr>
<th>Metropolises</th>
<th>Value added per worker, in 10^6 euros</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Lisbon</td>
<td>27,5</td>
</tr>
<tr>
<td>Porto</td>
<td>20,2</td>
</tr>
</tbody>
</table>

*Note: I, II, III—primary, secondary, and tertiary sectors*
sectors have twofold consequences in Porto: the lost of jobs and added value by itself in the manufacturing sector, and the derived lost of service jobs due to those trends.

The industry of electrical equipments and machinery has significance in the metropolis and is an example of a potential growth cluster, having at least one important large player—EFACEC group—several SME getting knowledge more intensive and R&D-oriented production in regional knowledge institutions.

In all, the productivity gap can be explained by a different sector mix and an intensity (knowledge) gap, with the depicted consequences in the attraction of qualified labour and higher income groups.

When looking at the average size of firms, both metropolitan economies are dominated by SMEs (see Appendix 1). Lisbon has many more large firms. The presence of large players, in particular in the more knowledge-intensive manufacturing sectors associated with FDI, offers a more favourable environment for knowledge-based entrepreneurship and start-up firms. The Lisbon region has a significantly higher proportion of internationalized and innovative SME. In Porto, the vast majority of SME firms has difficulties in innovating and is still concentrated in more traditional sectors.

Quality of Life

Concerning quality of life, both metropolis are endowed with relevant cultural facilities, like diverse top-level cultural venues, museums, and international schools. Porto was European Cultural Capital in 2001 (Lisbon was in 1994) and is home to two internationally known cultural attractions—Casa da Música and Serralves’ Museum. The coastal location, urban parks, and green areas give both urban areas important environmental amenities. Lisbon has the vibrancy and cosmopolitan ambiance typical of a European capital, and several leisure and economic amenities. Nevertheless, it already is experiencing diseconomies of scale related to traffic congestion and housing prices (see Appendix 1). In Porto, housing is relatively cheaper, though the City of Porto presently faces a serious problem of housing decay in the historical centre. In several respects, the development of quality of life in both metropolis has improved sharply in the last decades, mainly thanks to strong public spending (much of it EU funded), contributing to visible improvements in infrastructural endowments and the built environment.

Accessibility

During the last decades, accessibility has strongly improved in both metropolis. Lisbon has an important airport with hub character, with regular connections (see Appendix 1) for different continents, while a new international airport already is planned for the region. Lisbon will be connected to Madrid by the European High Speed Train (HST) network. The regional road connections link Lisbon to a much larger region, allowing it to reach a very large consumption and labour market.

Porto also has an international airport, recently enlarged and with cargo potential, with mainly European connections (see Appendix 1). Due to lowest air taxes and regional character, Porto increasingly receives low-cost airline flights, with direct connections to the main European hubs. Regional accessibility ensures cross-border influence toward Galicia/Spain, an attractiveness factor for firms. In Porto, the recent project of the light metro rail is bringing more integration within, reducing congestion and improving resident’s quality of life.

Diversity

Lisbon, as a capital city, tends to be relatively more diverse, culturally and ethnically, and with a larger urban dimension, compared with Porto. Taking
in consideration the share of foreign population, and though believing that globalisation trends are having a positive influence on it, the share of foreigners in Lisbon’s urban region was 6.2 in 2001. In Porto, that share was only 2.1% (although with a stronger concentration of EU nationals than in Lisbon). In both urban areas, can be found an important diversity in terms of economic actors and institutions, although, as it will be grasped, Porto lacks some important institutional endowments, relevant to thrive and to facilitate the governance of the urban knowledge economy.

**Governance**

**Degree of Policy Integration**

In terms of what is referred to as the degree of policy integration in the Portuguese context, namely in urban areas and metropolises, high levels of fragmentation and lack of integrative visions can be found. Policy interventions in cities tend to be poorly coordinated, with evidence of sub-optimal results.

Although to a large extent a national deficiency, when comparing Lisbon and Porto, we observe in the former relatively higher levels of policy integration. One reason is the presence of the national government, which facilitates the integration and articulation of national and local policies. Second, Lisbon has a tradition of local and regional institutions developing strategic planning instruments. The city of Lisbon, together with Amsterdam, Rotterdam, and Barcelona, were European pioneers in strategic planning experiences (1990-1992). These exercises were focused on a shared and participative vision (Lisbon Atlantic Capital), giving rise to some roots for local strategic partnerships.

Furthermore, in the late 1990s, and with the support of the central government, the region of Lisbon and Tagus Valley developed a strategic plan in an interactive manner, led by a strong technical and political leadership, which resulted in the EU Regional Programme of the Lisbon and Tagus Valley region. That exercise of strategic planning, with a strong focus on economic and scientific development, has become strongly institutionalized, with a permanent steering and monitoring committee to evaluate the results of the strategic (integrated and sustained) regional actions, activating partnerships and facilitating policy integration levels (see Ferreira, 2005).

The contrast with Porto is rather sharp, where the last metropolitan integrated diagnostic exercise dates of 1994. This reflects the difficulties in achieving consensus and horizontal policy integration, especially between the municipalities in the region. Although a metropolitan administrative authority exists since 1991 by decree (for both metropolises), its competences vis-à-vis the central government and the municipalities have never been clear, and thus the competences of the authority depends on the willingness of the different mayors to cooperate. Cooperation and policy alignment only happened scarcely in the past (except for some infrastructure and environmental planning). A main governance problem usually pointed out in Porto is the absence of leadership: there is no clear leading actor to assemble and steer strategic networks or to develop a common vision or strategy. Thus, complementarities and synergies in the regions remain to a large extent unused. A related setback is that Porto tends to lose lobbying power with national government (located in Lisbon), as Porto and the surrounding municipalities in the region still tend to act isolated instead of joining forces. Although a new breath has been recently given to Porto, by means of a stronger emphasis by elected mayors, the results are yet to be seen.

Moreover, in the Portuguese context, relevant policies to support urban competitiveness have been mainly national policies with low degree of territorial approaches. In this context, the national policy (namely science and economic policies) tended to favour the strongest concentrations of knowledge and the most dynamic sectors. Lo-
Urban Competitiveness in the Knowledge Economy: Evolution Paths of the Portuguese Metropolises

cal and regional policies have not changed the situation, being quite similar independent of the city’s profile, and mainly with an infrastructural focus (accessibility infrastructure, urban space, environment, etc.) lacking immaterial and integrated approaches.

Structure for Interaction Between Research/Education and Business and Start-up Support

In 1991, the Porto region received national political support to create a large science and technology park. It should bring together R&D activities and new firms, promote the development of spin-offs, and achieve critical mass, in order to attract high-tech FDI. At the same time, Lisbon was developing the Tagus Park, in the Municipality of Oeiras, today a very large pole, concentrating several knowledge-intensive firms, R&D centers, and a vast range of facilities and services. In Porto, things went different. Instead of creating one large park, it was decided to build three smaller ones to spread the benefits of the park more equally over the region, and to align the activities at each park with the local industrial base.

Weak social capital and cooperative behavior tended to hamper the Porto’s project, due to lack of consensus toward the location of the park, while there was no clear and accepted leadership to drive the project. This resulted in a long period of conflicts and paralysis. In that same period, relations within the region further deteriorated when a battle unfolded about the location of a large FDI project by Siemens/Infineon. Since then, the project of creating a large park in the metropolis definitely lost the momentum, and a smaller business park has been implemented, without the ambition of the first project. There are no public research facilities or universities located at the park. It is now occupied by very dynamic firms—some of them spin-offs from the University of Porto.

More in general, the Porto region lacks targeted spatial strategies to bring business and knowledge institutes closer together and create synergies between academia and young companies. As a result, R&D research centers and academia spin-off’s spread all over the region. This fragmentation of policy continues. Presently, at least two other innovation parks and start-up facilities are being planned in the metropolis, again without evidence of any coordinated effort by the different municipalities—each municipality seeks to lure high added-value firms and institutions within its borders.

The region benefits, nevertheless, from several national policy initiatives to promote entrepreneurship. The national innovation agency (ADI, a governmental institute jointly managed by the ministries of economy and science and superior education) providing incentives for high-tech firm creation. Examples of initiatives for starters are NEOTEC (for technological base starters and spin-offs) and nest (facilitate access to venture capital). Some other incentives are provided at the regional and local level, in particular by business associations, incubators, or representatives of business innovation centers (like the NORTINOV project, COHITEC project or CIENCINVEST network, all with regional influence).

Promoting entrepreneurship is high on the political agendas. It is regarded as a tool to fight unemployment and create economic growth. The coordination between national, regional, and local policies is poor, however. Stronger forms of coordination are found between venture and seed capitalists, local firms, and universities.

Public-Private Cooperation

In order to fully reap different resources of involved stakeholders and counter fragmentation, the public-private cooperation (but also public-public and private-private cooperation) is an increasingly used tool. Nevertheless, generally
speaking, the culture of that kind of partnerships is relatively low in Portugal as a whole, with the tendency for institutional barriers between different stakeholders, revealing low levels of social capital, a serious threat in an economic paradigm where networking is a key word. Several consultations conducted in the Porto region pointed toward institutional distrust and lack of cooperation between important regional agents (University of Porto, Municipality of Porto, Regional Development Bureau—CCDRN), although each acknowledges the need to cooperate and some progress can be observed (the University of Porto created a joint resources department, in order to combine their resources and steer partnerships—IRICUP).

Nevertheless, the extent of fragmentation was again illustrated during discussion platforms that were held to discuss the region’s competitiveness. Different stakeholders participated, but they did not achieve a fully shared common vision. Furthermore, the participation of the private sector was weak.

Once again, the strategic planning experience in the Lisbon’s region has been facilitating public discussion and the gathering for relevant agents in single platforms, mobilized for common development objectives in the region, with a relevant presence of private partners, who tend to share more often responsibilities for structural projects and have been pioneers in other forms of regional pacts and shared agreements, namely in order to manage EU structural funding.

SOLUTIONS AND RECOMMENDATIONS

Capital cities like Lisbon are typically better endowed to cope with the demands and challenges of the knowledge-based economy. Nevertheless, other cities—including cities inserted in regions with a strong industrial past, like Porto—have options to improve and remain competitive, although in this context the role of good governance and policy integration seems to be particularly important.

The model depicted in the theoretical framework, besides constituting a tool to assess the conditions and potential of urban regions in the knowledge economy, may help in designing integrative and tailor-made policies for different types of cities, tackling the improvement of structural assets and of governance efforts. It can be used for the case of Porto, and both for national policies and for policies at other government tiers (local or regional).

Porto and its region will count in the near future (2007-2013) with an important share of European funding, namely through the EU Cohesion Policy (increasingly focused in competitiveness goals), an important opportunity to catch up with Lisbon and add stronger engines to the country. The application of this instrument will be very relevant not only because of the funding, but also because it implies the design of strategic orientations and governance efforts toward the enhancement of the regional assets.

Some interesting policy options already are being designed, in order to improve the competitiveness of the city and region (both business and human capital development). In terms of assets’ development, namely the economic and knowledge base, policy makers are drafting strategic recommendations to deal with the structural change in the region by promoting economic diversification and developing new growth industries. After consultation with experts from business, academia, and government, a number of spearhead clusters have been identified, all of them with world growth tendencies, leverage effects in other sectors, and where the Porto’s agglomeration have competences (biotechnology and food/beverages, health sciences, medical equipment and pharmaceutics, information technologies, and electrical machinery). Moreover, the region also recognised the need to increase
the knowledge intensity of the still strongly present traditional sectors, like textiles and clothing (fashion industry, R&D), in order to avoid the full relocation of those sectors and the loss of an accumulated tacit knowledge base.

Since accessibility and cultural infrastructure have improved sharply in the last years, Porto also should make efforts to enhance its asset’s base through the development of the soft components, in order to take the maximum of present assets, enhancing attractiveness, accessibility, and quality of life. In the context of Porto, the proximity to Galicia and Spain should be used, in order to achieve critical mass and favour economic integration, namely to achieve complementarities in the economic and knowledge base. The achievement of synergies also may be needed at the regional scale, namely to use the different competences of different universities.

Our study also suggests that regional governance and cooperation enhancement may play a crucial role in shaping urban regions’ performance in the knowledge economy, and thus achieving better levels of policy integration is crucial. European Union’s Structural funding rules may have important contributes. The selection of investments should be increasingly selective and demanding, favouring strategic partnerships or projects surpassing the municipal scale, with strategic orientation. Thus, the institutional and organizational capacity and its development (public and private) are likely to constitute a key source of urban competitiveness for urban regions and on its ability to successfully shift toward knowledge-based economy, and specific policies should be direct to that instrumental aim.

CONCLUSION

This chapter focused on the competitiveness and transition paths of the two largest urban and economic concentrations in Portugal toward the knowledge economy. An integrative framework has been designed, in which the competitive performance of urban areas is linked to sources explaining that performance. Next, the frame was applied to Porto and Lisbon.

The evidence presented in this chapter hints at significant performance differences between the urban regions of Porto and Lisbon, both in terms of business development and human capital development, favourable to Lisbon. The performance gap has widened in the last 10 years, with signs of dynamic and cumulative gaps between both urban regions. Business development and human capital development tend, in fact, to reinforce each other, which is clearly visible in the agglomeration of Lisbon. Nevertheless, although education and qualifications have improved significantly in Porto’s urban region, though mainly indigenous, there is an increasing mismatch between qualification’s supply and the business absorption. This situation is leading to increasingly qualified unemployment in the urban region and to the migration of the most qualified to other national and international urban regions.

Our study suggests that the different performance levels can be explained by differences in rooted structural assets (industry structure, knowledge base, quality of life accessibility, diversity), but also by the governance quality in both urban regions.

In fact, this case study chapter points at the significance of regional/metropolitan governance as a factor explaining success in the transition toward knowledge-based economy. The results point at the quality of governance as a determinant whether regions manage to combine assets and invest strategically on an appropriate spatial level, with visible results of urban competitiveness.

FUTURE RESEARCH DIRECTIONS

The framework proved a useful conceptual and integrative tool explaining different urban region’s
competitive results and performance sources in the knowledge economy. We believe it can be useful as a policy tool box for urban regions, in order to monitor and evaluate their performance in terms of urban competitiveness. Moreover, and probably more important, it also can constitute a tool to understand its causes and support policy design, in different regions’ context.

Since structural assets and governance are very likely to continue stressing its role as main drives of knowledge urban development and competitiveness in the post-globalised world, the framework can be used to detect and analyze sources of urban competitiveness in other cities. It can be useful in order to design integrative policies to tackle the needs imposed by the economic paradigm, increasingly connected with the urban phenomena.

Nevertheless, more research appears to be needed in some complementary issues, in order to enrich the analysis potential.

First, the competitiveness sources of smaller cities and non-metropolis in the knowledge economy. In this context, the role of inter- and intra-regional cooperation might be relevant toward critical mass achievements and specialization (in some cases, cross-border cooperation is increasingly considered as a vehicle for this).

Second, it appears to be important to analyse more in-depth how different urban regions worldwide react to de-industrialization trends. How can cities and regions manage their industrial shift? Is it dependent on the specific manufacturing specialization sectors? What can urban policy makers do to support urban competitiveness?

Finally, there is the spatial scale of knowledge interactions. There is evidence that interactions knowledge production—knowledge economic application tends to happen in larger territorial scales, often not corresponding to any administrative border. How to capture and organize flows toward urban development?

REFERENCES


### ADDITIONAL READING


### APPENDIX 1: STRUCTURAL ASSETS IN THE PORTUGUESE METROPOLISES—SOME INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Final Value Lisbon</th>
<th>Trend</th>
<th>Final Value Porto</th>
<th>Trend</th>
<th>Year</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge Base</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEI Students</td>
<td>nº</td>
<td>138 998</td>
<td>(+)</td>
<td>71 100</td>
<td>(+)</td>
<td>2003</td>
<td>1990-2003</td>
</tr>
<tr>
<td>Employees with a higher education degree</td>
<td>%</td>
<td>14.6</td>
<td>(+)</td>
<td>10.2</td>
<td>(+)</td>
<td>2002</td>
<td>1997-2002</td>
</tr>
<tr>
<td>PhDs recognised by Portuguese universities</td>
<td>nº</td>
<td>349</td>
<td>(+)</td>
<td>133</td>
<td>(+)</td>
<td>2003</td>
<td>1970-2003</td>
</tr>
<tr>
<td>Total Human Resources in R&amp;D activities</td>
<td>EFT</td>
<td>12 109</td>
<td>(+)</td>
<td>3 201</td>
<td>(+)</td>
<td>2001</td>
<td>1995-2001</td>
</tr>
<tr>
<td>R&amp;D spending executed by firms</td>
<td>%</td>
<td>36</td>
<td>(+)</td>
<td>27</td>
<td>(+)</td>
<td>2001</td>
<td>1995-2001</td>
</tr>
<tr>
<td><strong>Industry Structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment in manufacturing</td>
<td>%</td>
<td>15.3</td>
<td>(+)</td>
<td>30.2</td>
<td>(+)</td>
<td>2001</td>
<td>1997-2001</td>
</tr>
<tr>
<td>Gross added value in the tertiary sector</td>
<td>%</td>
<td>79.8</td>
<td>(+)</td>
<td>71.1</td>
<td>(+)</td>
<td>2002</td>
<td>1995-2002</td>
</tr>
<tr>
<td>Average firm size</td>
<td>nº employees</td>
<td>13.6</td>
<td>(-)</td>
<td>11.7</td>
<td>(+)</td>
<td>2000</td>
<td>1990-2000</td>
</tr>
<tr>
<td><strong>Quality of Life</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Museum visitors</td>
<td>nº (thousand)</td>
<td>4877</td>
<td>(+)</td>
<td>1334</td>
<td>(+)</td>
<td>2002</td>
<td>1998-2002</td>
</tr>
<tr>
<td>Overnight visitors in hotels and similar</td>
<td>nº (thousand)</td>
<td>2818</td>
<td>(+)</td>
<td>944</td>
<td>(+)</td>
<td>2002</td>
<td>1996-2002</td>
</tr>
<tr>
<td>Average real estate acquisition cost</td>
<td>Euro/m²</td>
<td>1446</td>
<td>(-)</td>
<td>1190</td>
<td>(+)</td>
<td>2004</td>
<td>2001-2004</td>
</tr>
<tr>
<td><strong>Accessibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nº of passengers</td>
<td>millions</td>
<td>11</td>
<td>(+)</td>
<td>3</td>
<td>(+)</td>
<td>2004</td>
<td>1998-2004</td>
</tr>
<tr>
<td>Nº of air destinations</td>
<td>Nº</td>
<td>78</td>
<td>n.a.</td>
<td>31</td>
<td>n.a.</td>
<td>2005</td>
<td>n.a.</td>
</tr>
<tr>
<td>Modal Split (individual transport)</td>
<td>%</td>
<td>46</td>
<td>(-)</td>
<td>52</td>
<td>(-)</td>
<td>2001</td>
<td>1991-2001</td>
</tr>
<tr>
<td><strong>Diversity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Population</td>
<td>%</td>
<td>6.2</td>
<td>(+)</td>
<td>2.1</td>
<td>(+)</td>
<td>2001</td>
<td>1991-2001</td>
</tr>
</tbody>
</table>

**Source:** Carvalho (2005)

**Notes:**

- Tendency
  - (+) = Growth/Reduction with positive impact on the foundation
  - (0) = Stability
  - (-) = Growth/Reduction with negative impact on the foundation

- n.a. = not available.
- EFT = equivalent full time
- Porto and Lisbon correspond to its metropolises
Chapter XIII
A Knowledge-Based Urban Paradox: The Case of Delft

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ABSTRACT

Despite its strong technological profile, the city of Delft has problems to improve its employment situation. What is more, Delft’s considerable knowledge base has not been sufficient to promote a sustainable type of urban development that could benefit all of its citizens. This case-study analyses Delft’s current business and people climates with the purpose to indicate directions for the adjustment of Delft’s local development strategy to improve its sustainability. The results point out that Delft has placed very much emphasis on improving its business climate, but not so much attention has been paid to its people climate. Delft Knowledge City strategy still has little to offer to creative and foreign knowledge workers and students. In terms of people climate, shortages in housing and cultural amenities diminish Delft’s capacity to attract creative people. Further, the strategy still remains divorced from the worries of common citizens and the non-knowledge economic sector.

INTRODUCTION

This chapter is about Delft, a historic city of 95,000 inhabitants, considered the second major technological node of The Netherlands. Delft has a strong technological profile, including the largest Dutch technological university, a good economic position, and good economic prospects at the national and international levels. Evidence of the local situation of Delft suggests, however,
that the relationship between the knowledge-based economy and sustainable urban growth is not as straightforward as it might generally be considered. To improve its economy after the decline of its once prosperous manufacturing sector, Delft has presented itself as a Knowledge City since the early 1990s. But after almost 15 years of economic policies to benefit from the knowledge sector, the main goal—improving the employment situation—has remained unfulfilled. Delft’s considerable knowledge base has not been sufficient to promote a type of urban development that benefits all of its citizens. In 2007, the share of population that lives from welfare benefits in Delft (2,500 people) is 8% above the national average (Doorduy, 2007).

This chapter addresses the knowledge-based urban development of Delft from the perspective of sustainability. It explores the general question whether the presence of a solid knowledge base is a guarantee for a sustainable type of urban development. Its main objective is to indicate directions for the adjustment of Delft’s local development strategy to improve its sustainability. Provided this local scope, the study considers that a proper balance between a good business climate and a good people climate is the main determinant of a sustainable knowledge-based urban development. As a consequence of this local scope, important dimensions of sustainable urban development, as environment quality, are left out of the present study because they are largely non-local, neither in their nature nor in their related policies.

A considerable part of this chapter consists of an analysis of the current business and people climates of Delft. This analysis is preceded by a brief general sketch of Delft as a knowledge city from a national and a local perspective. On the basis of these analyses, we build a matrix to identify the weaknesses of Delft’s current situation for each of the main social groups that use the city. From this matrix, we draw directions for the adjustment of the local development strategy. The chapter starts with a short conceptual back-ground on the different views on knowledge-based urban development and the link to sustainable development.

CONCEPTUAL BACKGROUND

In a sense, knowledge creation and exchange have always been forces explaining city growth (Hall, 2000; Graham & Marvin, 1996). In the current economic context, however, the importance of knowledge in city growth has grown exponentially. Rapid technological advances in micro-electronics and telecommunications—and their eventual convergence into information and communication technologies (ICTs)—currently allow fast, cheap, and ubiquitous worldwide connectivity. This has led to profound changes for both home and work-related activities. Global connectivity in the spheres of work and production has produced the gradual transformation of the industrially oriented and spatially bounded economic organization into an increasingly complex, global, flexible, and knowledge-based economic organization.

The production, distribution, and management of information and knowledge have become main economic activities in the urban economy. As associated trends, Van Winden and van den Berg (2004) mention the volatile network character of the economic organization in terms of the ever-growing speed of diffusion of knowledge and the high rewards for entrepreneurship and innovation. Other frequently mentioned trends include the rise of research and development functions, the growing importance of education and training, the knowledge economy versus those excluded IURPLWVEHQH¿WV

The fundamental shift from tangible to intangible production has had obvious consequences for urban growth and development. An important group of regional economists claim that technology, organization, and territories are the “holy...
trinity of regional economics” (Storper, 1997). Local clusters of linked industries and institutions that have competitive success in a particular field are considered crucial in the new economics of competition (Porter, 1998). In the same line of thought, neo-Marshallian nodes (Amin & Thrift, 1992), technopoles (Castells & Hall, 1994; Malecki, 1991); and milieu of innovation (Castells, 1989) have been considered as key-locations for the economic development of urban areas. Knowledge spillovers and flows are identified as crucial for technological innovation, which in turn would generate regional growth. Under the assumption that cities grow by clustering high-tech industries and innovative businesses, stimulating (high-tech) entrepreneurship and shaping a good technological and business climate are considered indispensable for job and productivity growth.

A different, people-based perspective has become increasingly popular during the last decade. Based on empirical research in U.S. metropolitan areas, Glaeser (with different co-authors) has identified human capital (i.e., the presence of high-skilled workers), as the main predictor of (population and) productivity growth at both city and metropolitan scales (Glaeser & Saiz, 2003). Consequently, local strategies to increase the human capital of cities would promote their economic growth and level of competitiveness.

Florida (2002) emphasizes people’s creativity rather than levels of formal education, as the key resource for economic success. His formula for economic success of cities relates three Ts: tolerance, talent, and technology. Cities must nurture and nourish the creative class, consisting of two groups: a super creative core and the professionals in charge of implementing the ideas of the first group. Creative workers prefer inspiring cities with a good quality of place, characterized by a thriving cultural life, a tolerant and open social climate, and high diversity. Florida stresses that a good people climate that attracts a diversity of creative people is more important than a good business climate for technology-based economic growth (Florida, 2002, p. 283).¹

The presence of creative lifestyle amenities is an important component of Florida’s concept of quality of place in cities. Other studies have shown that (US) cities with a high-level of amenities in general grew faster than cities with fewer amenities (Glaeser et al., 2001). This has promoted the concept of cities as centers of consumption, not only understood as the consumption of manufactured goods but increasingly as the consumption of services, symbols, and values: “… places, shopping, eating, fashion, leisure and recreation, sights and sounds can all be ‘consumed’” (Jayne, 2006, p. 5).

A few years earlier, Knight (1995) stated, based on research in U.S. and European cities, the need to link culture and knowledge for the sake of urban development in an open and increasingly knowledge-based global society. In this line of thought, Hall (2000) presented empirical evidence from cities in the UK, paying attention to the role of cultural industries and advocating the marriage of arts and technology. The role of tacit knowledge and face-to-face contacts in advanced and strategic sectors has been another important concept explaining innovation and growth in the new context. Face-to-face proximity is essential in those environments where information is imperfect, not easily codified and rapidly changing, as in many creative activities. These types of contact have specific advantages for communication, coordination, and motivation (Storper & Venables, 2004). Informal encounters in cafés, cultural events, restaurants, and afterwork activities promote the cross-fertilization of ideas and knowledge. Cities with buzz—spaces where diverse people meet and interact—are attractive to highly skilled people.

The importance attributed to these types of determinants of urban development—human capital, talent and creativity, amenities, culture, art, face-to-face contacts, and so on—represents
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a significant shift in the field of regional economics. Economic growth would be more related to the soft (human) aspects than to the hard (technological) aspects. Nevertheless, the rise of ICTs and global connectivity also has increased the awareness of the inherent complexity of cities. In this context, a more comprehensive notion has been gaining ground, in which both the hard and soft aspects, that is, production and consumption, count (Malecki, 2002). Malecki has stated this notion clearly: “All the issues that have risen to the top of the research agenda over the past 30 years are relevant—indeed essential—for urban competitiveness. These include high-tech, agglomerations and clusters, entrepreneurship, amenities, education, knowledge … the list goes on. Having only some of these conditions in good order is not enough; moreover, assembling them all demands public–private co-operation.” (Malecki, 2002, p. 941).

The above foundations should have an adequate balance to achieve sustainable urban development. According to Duijvestein and van Dorst (2006), sustainable urban development that meets the needs of the present but does not compromise the needs of future generations requires connecting four basic qualities: (a) spatial quality (linked to projects), (b) social quality (related to people), (c) environmental quality (thinking of the planet), and (d) economic quality (in search of prosperity). This means searching for a proper balance and setting priorities between the local and global scales, the natural and built environment, and the demands of the people and of the economy.

Provided both its local scope and its limited size, this chapter takes a less ambitious perspective, concentrating on some essential local qualities for sustainable knowledge-based urban development. On this local level, we consider sustainable development of a city to depend on its balanced use by different groups of people. The more these groups can obtain the jobs, housing, and amenities they desire, the more they can participate in the economic, public, and cultural life of the city, the more sustainable the city is. We, therefore, focus on whether different groups of people want to live, work, spend their leisure time, use their amenities, and/or visit the city. These qualities are part of either the business climate (to generate jobs) or the people climate (which involves housing, general urban amenities, buzz-related amenities) of a city.

MAIN ISSUES OF DELFT’S SITUATION

Delft enjoys an excellent national and international accessibility because of its privileged location in the south wing of the Randstad, between The Hague and Rotterdam. The Randstad is The Netherlands’ major polycentric urban region, which includes the country’s four largest cities: Amsterdam, Rotterdam, The Hague, and Utrecht. Within this polycentric region, labor markets, residential environments, and cultural and recreational facilities are spread over many cities and towns, located within reasonable traveling times. Figure 1 provides a scheme of the daily home-work mobility flows in the Randstad as an illustration of its network configuration. At the lowest level, each of the four main cities is the hub of its own city-region. At the intermediate level, the Randstad can be divided into a north wing (the Amsterdam—Utrecht axis) and a south wing (the Rotterdam—The Hague axis).

The Netherlands counts with great assets for the transition toward a knowledge-based economy. It has an open economy with high levels of exports, a high-quality road infrastructure, a very high level of digital connectivity, a highly educated population, and highly-ranked universities and research centers. Nevertheless, the country has been falling behind regarding technology production and innovation capacity in relation with other European economies (Ministry of Economic Affairs, 2004). The worrying trends refer to relatively few graduates in engineering
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To tackle this, the government implemented a series of policies in 2003 under the umbrella of the Innovation Platform. These new development policies have a strong bias toward hard science, technology innovation and industrial R&D. Within them, universities and research institutes have a leading role to improve the links between knowledge institutions and private firms. They are considered breeding grounds of R&D activities in the so-called “knowledge-intensive industrial estates” (Ministry of Economic Affairs, 2003). Following this policy, the three technical universities in the Netherlands are now giving high priority to knowledge valorization, the commercial translation of existing scientific and technological knowledge, so that companies can make use of it (TU Delft, 2005).

Ponds and van Oordt (2006) have identified the main hubs of knowledge networks in The Netherlands. The technical university (TU) cities of Eindhoven and Delft are mentioned as the hubs for physical sciences, while Leiden, Utrecht, Amsterdam, and Wageningen are the hubs for life sciences. Eindhoven and Delft have an important role to play in the new technology-oriented development policy. Eindhoven, which ranks the highest on high-tech industrial employment and R&D activities, has been appointed as the national “brainport,” the main location for the development of a regional innovation system (Ministerie van VROM, 2005). Delft’s advantages over Eindhoven are its location within the Randstad and its national and international accessibility.

Delft is the seat of the oldest, most prestigious, and most international of the three technical universities in The Netherlands, which counts with 13 specialized research centers. The city also houses many other research institutions and knowledge-intensive firms. The most salient is TNO, the Organization for Applied Scientific Research, which has its headquarters and two of its five divisions in Delft. The picture changes, however, if Delft’s urban situation is considered...
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At a local level. The city used to be a prosperous manufacturing centre, but its industrial economy began to decline during the 1970s. Since then, improving the possibilities for employment generation became the city’s main policy focus.

Facing unemployment, the municipality commissioned an explorative study concerning Delft’s economic possibilities, especially regarding knowledge-based activities, in 1990. The research, conducted by Richard Knight, stated Delft’s privileged position in terms of knowledge, recommending exploiting this for local economic development. On the other hand, Knight pointed out that Delft’s milieu was not conducive to knowledge-based development, due to the limited synergy within the knowledge sector and between this sector with the local community. The knowledge sector was described like an island in the city: most high-skilled knowledge workers lived outside Delft, hardly developing a link with the city, while Delft residents mainly fulfilled the lower-rank jobs. These two trends promoted social, economic, and spatial divisions between the local population and the knowledge workers (Knight, 1995). To face this problem, Knight recommended policies to integrate knowledge-based activities into the city life.

Knight’s study served as a basis for a new vision on economic policy by the Municipal Council in 1991. The main accent of the new policies was rather traditional, however, and focused on the supply of office space and business parks for a certain profile of businesses (Van der Geest & Heuts, 2005).

In 1994, a new local government decided to give more emphasis to work and employment generation, focusing on the creation of knowledge-intensive firms. Delft Kennisstad (Delft Knowledge City) became the main economic strategy. The previous vision was expanded to include the promotion of network development and coordination between the municipality and the business sector with the same goal of employment growth. A product of this was the establishment of the Delftech Science Park close to the TU Delft campus. The 1996-1999 Action Plan that followed produced many other initiatives for creating new jobs in the high-technology sector but was not very successful (Van der Geest & Heuts, 2005).

So far, the Delft Knowledge City strategy has not been able to improve Delft’s economy. In the 1997-2002 period, the best-growing years of the Dutch economy, the number of jobs in Delft increased by one fifth, but after 2002 it decreased again (see Figure 2). More importantly, the share of jobs in knowledge-intensive sectors slightly decreased, from 38.0% to 36.4%.

Figure 2. Number of firms and jobs in Delft 1997-2005 (Own elaboration with data from Gemeente Delft, 2004, 2006)
Furthermore, the city’s employment growth during 1996-2002 scored low compared with other Dutch cities (see Figure 3). Indeed, Delft constitutes a case that contradicts the usual assumptions of regional economics, human capital, and Florida’s theories. After studying the correlation between the size of the creative class and employment growth in the 50 largest Dutch municipalities, Marlet and van Woerkens (2004) concluded that the size of the creative class was a good predictor of job growth in The Netherlands. Delft was, however, the most remarkable exception in this correlation, with a lower job growth than what was expected for its relatively large creative class. In spite of these disappointing results, the evaluators of the Delft Knowledge City policy consider that Delft has a good basis for employment growth in the future (Van der Geest & Heuts, 2005, p. 75).

THE BUSINESS CLIMATE OF DELFT

Delft Knowledge City policy has aimed at shaping a good business climate, especially oriented to the high-technology sector and with the aim to generate jobs. The capacity to generate new jobs for qualified and creative people is an important pillar of sustainable urban development. Since 2003, national development policies also have emphasized this orientation, stating that a good R&D climate is indispensable to attract investments, not only from multinational firms but also
from SMEs. These new policies also stress the need of applying knowledge in products, services, and processes to help firms improving their market position. Accordingly, knowledge valorization recently has attained an important place in the policies of the Dutch universities.

Delft has difficulties in attempting to valorize its assets, however, since only a portion of its advanced knowledge finds its way toward economic implementation (Bakkeren & Stoffels, 2004). Eindhoven, the seat of the second largest technical university, performs much better in that respect. It has a good number of private firms’ research offices and technology incubators, including Philips, one of the largest electronic firms in the world. Thanks to the production of the several divisions and laboratories of Philips Electronics, Eindhoven scores high on high-tech industry employment and R&D activities.

Due to its small internal market, R&D activities in The Netherlands are mainly internationally oriented. Accordingly, the connection of R&D firms with international networks is more important than with the local ones (Weterings et al., 2005). In this regard, Delft lacks the presence of a large multinational firm that could help it to valorize its knowledge base at the international level. In addition, fruitful cooperation between universities and SMEs is not easy to implement. Knowledge centers and, in particular, universities tend to embrace a supply-led approach. However, research shows that top-down (and technology push) approaches generally do not work. Paying attention to the R&D needs of the local firms is more efficient to improve employment growth than attracting R&D firms (Drewe, 2002).

Regarding the local knowledge networks, only Delft University generates spin-offs and maintains relations with local firms; other knowledge institutes in the city (such as TNO) hardly do so. Further, the type of knowledge relations maintained between Delft University and local firms that could directly contribute to knowledge valorization is limited, as the results of a 2004 survey among small-scale knowledge firms in Delft has shown (see Table 2).

An important way to improve knowledge valorization is through the promotion of techno-starters. Following the national guidelines, Delft university has made the increase in the number of spin-offs an explicit goal of its policy. YES!Delft, an existing initiative of the university and the local government recently has begun an active campaign to make the potential techno-starters

### Table 2. Types of knowledge-relations between and knowledge-intensive firms and the TU Delft (Bakkeren & Stoffels, 2004, p. 14)

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of relations</th>
<th>Percentage of firms (rounded to 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal</td>
<td>Use of library</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Attendance of public lectures and meetings</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Personal contact with lecturers an researchers</td>
<td>50</td>
</tr>
<tr>
<td>Formal</td>
<td>Use of patent</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Use of laboratories</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Forward and backward supplies</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Attending (post)academic courses</td>
<td>10</td>
</tr>
<tr>
<td>Education and</td>
<td>Cooperation in doctoral research</td>
<td>10</td>
</tr>
<tr>
<td>Personnel oriented</td>
<td>Taking graduates into employment</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Apprenticeships and final projects</td>
<td>45</td>
</tr>
</tbody>
</table>
students, university researchers, and PhD candidates) aware of the possibilities and advantages to set up a technical enterprise in Delft. They offer facilities, coaching, education, and a network of service providers. A congress was held in May 2007 at the TU Delft campus to give visibility to Yes!Delft activities, whose motto is “Building tomorrow’s leading firms.”

The municipality also intends to stimulate the creative industry. Despite its small size, comprising 3.6% of the total jobs in 2005 (1,490 persons), the municipality considers it a strategic type of industry in view of its multiplier effects (Gemeenteraad Delft, 2006). This includes the architecture, design, media, Web-design, publishing, art, music, photography, commercials, radio and television professionals. The municipality has reconverted old industrial buildings—Bacinol (I, II and III)—to make inexpensive workshops available for architects, designers, and artists. There also is an exhibition space where their works are shown (http://www.bacinol.nl/).

Another important initiative between the university and the municipality is the realization of Technopolis located in a 70 hectares terrain at the southern fringe of the Technical University campus, along the A13 highway and at close distance to the Delft South train station. Technopolis will have great accessibility for both car and public transportation users. A tram line will link Technopolis and the TU Delft campus with the city centers of Delft and The Hague in 2008. Developing the area and giving it a high-tech character, the city hopes to attract high-profile firms. In 2025, it should count with 600,000 square meters of floor space for 12,000 to 15,000 jobs. The design concept is focused on the possibilities for face-to-face contacts, the availability of central functions and a good environmental quality (Gemeente Delft, w/d).

Even if it succeeds, this ambitious project probably will not have great local impact since it will reproduce the existing commuting trends that exist in Delft’s knowledge sector. Most of the knowledge institutions in Delft are precisely located along the River Schie and the A13 highway, at the south of the city centre, while Delft’s inner city has a small amount of jobs, mainly in the hotel and catering sector (Stoffels et al., 2006). In view of this spatial segregation, great part of knowledge workers has no contact with the city centre, where most of Delft’s amenities are located. Technopolis probably will reinforce this trend.

Delft’s main stakeholders are aware of the current situation of the business climate. In order to improve it, the Delft Platform for Economic Affairs (PEZ) signed an agreement in February 2007. The initiative came from the municipality, the Chamber of Commerce, SMEs Delft, the hotel and catering sector, and the Network of Entrepreneurs from Delft (VNO-NCW). PEZ aims to improve Delft’s image, to deliver products and services with a larger value added, to create 800 new jobs each year and to promote sustainable economic development. To fulfill these goals, they have elaborated the Economic Agenda of Delft (http://www.economischeagenda.nl/), in order to link all the different economic initiatives to shape a successful business climate.

THE PEOPLE CLIMATE OF DELFT

Housing and the right amenities are elements of the people climate that are considered critical to attract creative workers, hence to contribute to sustainable urban development. The municipal council (Gemeenteraad Delft, 2006) and the private sector (Stoffels et al., 2006) also are aware of the relevance of the people climate in the context of the knowledge economy. This situation is, however, more difficult to shape than the business climate.
Knight commented already in 1995 on housing as a significant problem of Delft's quality of place. He mentioned that "Delft, a city of 80,000 residents, is a small and compact city and was, until a decade or so ago, a thriving manufacturing centre and most of its housing was built as social housing for the factory workers" (Knight, 1995, p. 243). He claimed that from the 10,000 persons waiting for housing, few qualified for social housing, and consequently many knowledge workers had no option but to commute. This problematic housing situation has not improved in these 12 years.

Compared with other European countries The Netherlands still has a large proportion of social housing, despite that since the 1990s national policies have strongly promoted homeownership. Among the 50 largest Dutch municipalities Delft has the third highest proportion of social housing. Consequently, Delft's owner-occupied housing—33.5% of the total housing stock—is much smaller than the national average, 43% (Marlet & van Woerkens, 2004). The large social housing stock constitutes a bottleneck, because to enter this system, a household should earn a maximum monthly income, a requirement which disqualifies most knowledge workers.

On the other hand, Delft's total housing stock—47,671 dwellings in 2004—has not grown in relation with the local demand because of the lack of appropriate building sites inside Delft's boundaries. Nineteen percent of the current housing stock was built during the 1980s, 13% during the 1990s, and less than 2% during 2000-2004 (Gemeente Delft, 2004, 2006). After the construction of Tanthof West, in the 1980s, there was no available land for new expansions inside Delft's boundaries—44.6% of Delft's total surface (2631 ha.) already consists of built areas (Marlet & van Woerkens, 2004). Since that time, the local government strategy has been to promote the construction of small-scale housing projects, generally in the city centre.

Pressures on the housing stock are translated into shortages in both social and owner-occupied housing. Since renters who can buy a house do not find appropriate dwellings, they stay in the social housing system, hindering the entrance of new households to the system. In 2004, only 2,000 dwellings were available for rent in Delft against almost 27,000 applications, although not exclusively from Delft (Gemeente Delft, 2006). The shortage of social housing partly explains the large outflow of graduated students, the potential techno-starters, from Delft after their graduation; larger than, for instance, from Eindhoven and Enschede (Stoffels et al., 2006, p. 28; Gemeente Delft, 2006).

Foreign students also complain that their accommodation, arranged by the TU Delft, is too expensive. These rented single rooms (1,100 in 2007) are used by 85% of international students, who pay 350 euros per month, and are obliged to stay for a whole period without the right to terminate the contract (Rullmann & Benshop, 2007). Comparing with the average rent for a whole dwelling in the province of South Holland, 357 euros (Ministry of VROM, 2004), foreign student accommodation is indeed expensive.

Additionally, there has been a huge increase in the housing prices during the last decade. This is a national trend, but the price rise has been higher in Delft than in The Netherlands as a whole. Table 3 shows the value of owner-occupied dwellings in 2003 and 2005, illustrating the huge shift of the value toward the higher category in just a two-year period.

Because of the lack of available land, Delft cannot do much about the local housing conditions. Part of the demand has been directed toward two new neighbourhoods built at Delft's west border, at the other side of the highway linking Rotterdam and The Hague. The largest is Ypenburg, within The Hague municipality, which has 8,500 new dwellings (and will grow up to 11,000). The second is Emerald, in the Pijnacker municipality, with 2,500 recent dwellings. The local government has
made great efforts to link these two areas with Delft’s city centre. Recent surveys show, however, that since their residents come from different cities in the region, not all of them feel attached to Delft or use its urban amenities.

The shortage of affordable and adequate housing mainly affects lower-income groups and knowledge workers in artistic fields such as architecture or design (the Bohemians), who would prefer inner city environments, as opposed to those in applied sciences and technical fields (the nerds), who would prefer suburban environments or smaller urban settings (Marlet & van Woerkens, 2004).

**Amenities**

Delft is world-known for its characteristic blue ceramic pottery and has a small but well-preserved centre that attracts a good number of day-trippers and foreign tourists. For them, there are enough museums, souvenir shops, historic monuments, a very nice historic architecture, and several seasonal events and festivals. Delft counts with two blue-porcelain workshops, 13 museums, and 23 art galleries and ateliers. In May 2000, the Vermeer Centre opened its door to the public, dedicated to this famous painter who lived and worked in Delft during the Dutch Golden Age.

The attractiveness of Delft’s historic centre is widely recognized at national level. However, the situation of amenities for Delft’s young residents is not too positive compared with the facilities that uphold Delft as a tourist destination. This is especially true for the cultural scene. Due to its rich history, Delft has more museums than the average of the 50 largest cities in The Netherlands, but it has approximately half of the average number of theatre performances (Marlet & van Woerkens, 2004, p. 71).

Not surprisingly, young people consider Delft a boring place to live. It simply misses urban

### Table 3. Distribution of owner-occupied houses by value in 2003 and 2005 (Based on: Gemeente Delft, 2004, 2006)

<table>
<thead>
<tr>
<th></th>
<th>&lt; € 100,000</th>
<th>€ 100,000 – 199,999</th>
<th>&gt; € 200,000</th>
<th>Total share of owner-occupied housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 2003</td>
<td>11%</td>
<td>19%</td>
<td>3%</td>
<td>33%</td>
</tr>
<tr>
<td>Jan. 2005</td>
<td>2%</td>
<td>13%</td>
<td>21%</td>
<td>36%</td>
</tr>
</tbody>
</table>

### Table 4. Comparison of amenities in Delft, Eindhoven, and Enschede (Based on: Keuzegids, 2006)

<table>
<thead>
<tr>
<th></th>
<th>Delft</th>
<th>Eindhoven</th>
<th>Enschede</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants.</td>
<td>94,770</td>
<td>209,310</td>
<td>154,257</td>
</tr>
<tr>
<td>Number of institutes of tertiary education (incl. TU)</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Number of students</td>
<td>16,100</td>
<td>25,300</td>
<td>20,800</td>
</tr>
<tr>
<td>Number of pubs</td>
<td>40</td>
<td>129</td>
<td>58</td>
</tr>
<tr>
<td>Number of museums</td>
<td>13</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Number of cinemas</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Report mark by students for catering</td>
<td>7.5</td>
<td>7.8</td>
<td>7.9</td>
</tr>
<tr>
<td>Report mark by students for cultural climate</td>
<td>7.2</td>
<td>7.4</td>
<td>7.6</td>
</tr>
</tbody>
</table>
facilities with the right atmosphere to generate buzz (e.g., the right kind and number of places where people meet informally). Cafés, restaurants, clubs, and places to go out are poorly developed in Delft. Foreign students complain that there is no good accommodation, no nightspots, no trendy clubs, or nice shops; and that the city is extremely boring during the weekends.

The city counts with one library (with a media and art centre), two sports halls, three swimming pools, four cinemas, 65 cafés and pubs, and 121 restaurants and bars serving meals (http://www.delft.nl). Delft has only 6.9 cafés per 10,000 inhabitants, while the average Dutch city has 8.1 (Marlet & van Woerkens, 2004). Compared with the two other TU-cities, Eindhoven and Enschede, Delft counts with fewer pubs. At the same time, Delft students assign lower report marks to the quality of catering and cultural amenities than students in Eindhoven and Enschede (see Table 4).

Furthermore, the amount of floor space of retail of non-daily goods—including the fun shops (fashion and luxury goods) that are part of the buzz of the city centre—decreased by 7% between 2001 and 2005 (calculated from Gemeente Delft, 2006). However, the situation recently has improved, thanks to the renovation of the Zuidpoort, dedicated to housing, commerce, and cultural functions. This inner-city project includes fun-shopping retail, the construction of a large underground parking garage, and the relocation of the library, media and art centre in front of the multiplex cinema and theater to conform a cultural corner.

If the city centre is not especially lively for the young, artistic, and intellectuals, the situation of the university campus—where most of the students and university staff-members spend most of the day—is even worse. Richard Knight’s comments still are valid: “many organizations such as the TU, which were once creative forces in the cultural life of the city, have withdrawn physically and psychologically. The university, by creating its own huge campus area on the outskirts and moving its facilities out of the city centre, has become a separate entity isolated physically, socially and culturally. This bifurcation of the city has greatly weakened its cultural life. Local residents rarely visit the campus area other than to work and many cultural facilities in the centre have had to close” (Knight, 1995, p. 244).

Since 1995, the campus has withdrawn even more from the centre. The central library and the few university buildings within the city centre have been sold and moved in to the campus, as well as the central administration building located closer to the centre. The university sport and cultural centers have been located at the end of the campus, at the opposite side of the city centre. Furthermore, the campus has few urban facilities; there is no central gathering place, and there are no attractive meeting places outside the university buildings. The only commercial services are a post-office cum magazine shop, and an automatic gasoline station. The campus is a desolate area after office hours and during the weekends. There is no reason for ordinary residents to visit this area.

**EVALUATING DELFT AS A SUSTAINABLE CITY**

To evaluate Delft as a sustainable city, we distinguish seven groups that live, work and occasionally use the city, and assessed their situation in terms of housing, general amenities, buzz-related amenities and jobs. The groups are: (a) tourists; (b) students of the several educational facilities; non-knowledge workers, among whom we distinguish; (c) those with a proper income; and (d) those with a low-income; knowledge workers, which we divide into three groups: (e) “Bohemians” (creative workers, such as writers, artists, graphic designers, actors, musicians, painters, dancers, and the like), (f) “nerds” (technology workers), and (g) foreign knowledge workers, mostly researchers or PhD candidates on temporary contracts.
The colors of the cells in Table 5 show how much the user groups are favored. The cells in light grey represent the variables that constitute no (major) problem for that user group; the cells in middle grey correspond to issues that cause difficulties at the local level, but can be solved by commuting or using facilities at regional level (in particular, in Rotterdam and The Hague); and the cells in darker grey indicate the main constraints for the integration of the knowledge sector and the rest of the city—therefore, they represent threats to Delft’s sustainable development.

Due to its historic and artistic amenities, Delft attracts culturally oriented affluent tourists, who constitute the less-problematic group. Students, who constitute 8.4% of the residents, have no major problems regarding jobs and general urban facilities. Their accommodation was traditionally a problem, but prices are now a little below the national average and the quality of the rooms a bit better than the national average (Keuzegids, 2006). Foreign students, who now constitute more than 10% of all students, complain that finding a room is difficult and relatively expensive. Students’ main complaint is, however, the lack of buzz-related amenities. Through the years, they have spread Delft’s image as a boring city throughout the country. It indeed lacks recreational amenities.

### Table 5. Main urban issues for different user groups of Delft

<table>
<thead>
<tr>
<th>User groups of Delft</th>
<th>People climate</th>
<th>Business climate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Housing</td>
<td>Amenities</td>
</tr>
<tr>
<td>Tourists</td>
<td>No issue</td>
<td>Plenty, historic centre, many monuments, Delft blue</td>
</tr>
<tr>
<td>Students</td>
<td>Accommodation at national average, problem for foreigners, shortage of housing for starters (graduates)</td>
<td>No big issue</td>
</tr>
<tr>
<td>Non-knowledge workers</td>
<td>N o n - l o w - income</td>
<td>Price-risings, many prefer VINEX neighbourhoods</td>
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<tr>
<td>Low income</td>
<td>Difficulties to obtain social rented housing.</td>
<td>No big issue</td>
</tr>
<tr>
<td>“Bohemians”</td>
<td>Prefer city centers, shortage in Delft city center, do not like VINEX</td>
<td>Cultural facilities in The Hague and Rotterdam</td>
</tr>
<tr>
<td>“Nerds”</td>
<td>Prefer suburban places, many live outside Delft (incl. VINEX)</td>
<td>Proximity to The Hague and Rotterdam, or use amenities in place of residence</td>
</tr>
<tr>
<td>Foreigners</td>
<td>Prefer city centers, shortage in Delft city center, do not like VINEX</td>
<td>Lack of educational amenities for children</td>
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</table>
for young people, meeting spaces, cafés, places to go out in the evening or on the weekend and the like, as previously mentioned.

Access to local housing and jobs are the main issues for non-knowledge workers. If they have a proper income they may rent or buy a house in the recently-built neighborhoods adjacent to Delft, since they do not mind living in the suburbs. They also have commuting tolerance; a large share of the city’s working population commutes to work elsewhere in the region. The picture is quite different for low-income groups who have difficulties getting access to social housing and the scarce jobs with low-entry barriers. The high proportion of commuters among Delft’s knowledge workers creates relatively few such local jobs in services like retail, catering, and the like.

Knowledge workers, assuming that they have adequate income, have different prospects according to their type. The artistic or intellectually oriented community, the Bohemians, have the greatest difficulties to live in their preferred inner-city locations, where they can interact with people. Housing in the city centre is scarce and expensive, however, and Delft has little “third places which are neither home nor work” (Florida, 2002, p. 225) for the exchange of information and ideas. Despite the relatively high proportion of creative workers in Delft,—the city had the sixth largest group among the 50 largest cities in The Netherlands in 2006—these Bohemians are not many in absolute numbers, 3.6% of total population (Gemeente Delft, 2006), which explains the limited artistic scene in Delft. Local Bohemians are mainly linked to ceramic ateliers or the architectural field. Since this group hardly finds the cultural amenities it demands, it has widened either its housing market, leisure market, and/or job market to The Hague, Rotterdam, or even Amsterdam.

The nerds are not as disadvantaged as the previous group, since they prefer suburban residential environments and, therefore, have fewer problems living outside Delft, although some of them might feel compelled to commute. They also are less interested in urban buzz-related amenities. They can use the urban facilities at the regional level, if they live in Delft; and if not, they use the ones of the place where they live. In the future, they have good job prospects in the new Technopolis Park, far outside the city centre.

Foreign knowledge workers, finally, have a different relationship with the city than workers of Dutch nationality. Since they usually have no social circles in The Netherlands when they arrive, they prefer central city locations or places where they can meet new people. In this regard, they experience the same problematic issues as Bohemians, due to the scarcity and high prices of dwellings inside Delft and the lack of buzz-related facilities. Since they are in Delft for employment reasons, getting a job is not an issue. On the other hand, some urban facilities that would be required by the foreign workers with families are lacking, such as international schools. This problem should be solved at the regional scale, in particular, at the international school in The Hague.

The above results point to three problematic issues. The first of these is buzz-related amenities, demanded by students, Bohemians, and foreign workers. The second urban constraint is in the field of housing, although this is rather different for Bohemians and foreign knowledge workers than for low-income non-knowledge workers. The third problematic issue is in the field of employment for low-skilled workers. This group is relatively small given the large proportion of the employed population of Delft that has received an intermediate-level (34% in 2003) or high-level (46% in 2003) education (Gemeente Delft, 2006), but the number of jobs for these workers also is relatively small in Delft and their tendency to commute usually is limited. This problem may be relieved if Delft succeeds in creating better conditions to attract knowledge workers to live and to consume in the city.

Local urban policies should consider two directions to improve both the city’s potentialities
and its sustainable development. The first is the adjustment of the housing stock, in the social housing segment and the free market segment. The great mismatch between supply and demand in the local housing market needs extra efforts to supply houses types according to the preferences of two strategic groups: recently graduated students and foreign knowledge workers. The second direction is the upgrading of the buzz-related amenities in both the city centre and the TU campus. In order make Delft a more lively and active city, the city should encourage cultural amenities and stimulate private sector initiatives to create attractive third places.

CONCLUSION

During the last 15 years, Delft’s local strategy for urban development has focused on shaping a good business climate rather than a favorable people climate. Since 2003, this bias for (high-tech) production has received an additional impulse, following the main guidelines of the national economic policy, which strongly favor science and technology. As the second technological node, Delft has an important role at national level.

Delft Knowledge City policy aims at taking advantage of this situation, assuming that a larger knowledge-based production will lead to a type of urban development that benefits all citizens. This emphasis intends to create new jobs; something worth aiming for, given the employment problems of the city. However, despite the recent improvement of the economy, Delft has insufficiently succeeded in integrating the knowledge sector within the local city life, a problem that already was pointed out in 1990. It still has little to offer to creative as well as foreign knowledge workers and students regarding housing and cultural amenities. Its capacity to attract talented knowledge workers to consume locally is very limited, which in turn constraints the improvement of the non-knowledge economic sector. This situation verifies Knight’s old claims that much more attention is needed to the people climate in order to overcome the knowledge divide.

Delft can permit itself this disregard to the consumption aspects of city life because of its favorable location and accessibility. It “borrows” amenities, buzz, and residential environments from The Hague and Rotterdam. But this situation does not contribute to a more sustainable urban development, since it is an obvious disadvantage for those residents who do not have the resources—in terms of money, time, health, social networks, or knowledge—to operate along larger urban networks.

The case of Delft is useful to contradict reductionistic considerations that claim that the knowledge or technological base of a city, or the presence of a highly skilled population, will per se bring a sustainable type of urban development. The main conclusion of this chapter is that approaches that consider the city merely in terms of economic processes are insufficient for the attainment of a sustainable and balanced urban development.

FUTURE RESEARCH DIRECTIONS

Located in the south wing of the Randstad, Delft is part of a polycentric urban region. Such regions are configurations of smaller and larger urban centers at close proximity whose labor, residential, and service markets tend to merge together. For the study of the qualities of both the business and the people climate as main elements of sustainable urban development, as well as for indications for further development of these qualities, a regional perspective is indispensable for cities like Delft. And Delft is not an exception: polycentric urban systems characterized by intensifying functional interactions of places and centers, have become one of the defining characteristics of the urban landscape in technologically advanced economies.
REFERENCES


**ADDITIONAL READING**


ENDNOTES

1 A study contrasting Florida’s creative capital theory (focusing on what people do for a living) with Glaeser’s human capital theory (focusing on skills and education level) has empirically shown for The Netherlands that the first is a better predictor of urban growth (Marlet & Wolkers, 2004). Nevertheless, this study also found that human capital indicators are related to employment growth (in commercial, financial and start-up firms), which suggests that both the right atmosphere for social interaction and a skilled and educated labor force are significant. On the other hand, the presence of a tolerant environment of artists and an ethnically diverse population still appears inadequate for the attraction of talented people in The Netherlands (Marlet & Poort, 2005).

2 This bias has been frequently criticized. Based on the results of studies of the spatial patterns of the knowledge economy, Weterings et al., (2005) claim that the new national development policies have a too narrow technological focus.
Section IV
Planning for Knowledge-Based Development
Chapter XIV
Emerging Middle Eastern Knowledge Cities: The Unfolding Story

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ABSTRACT

Examination of the knowledge cities’ contemporary status reveals tangible developments and collective efforts for declaring and building such cities around the globe. On the contrary, Middle Eastern cities are building technologically isolated entities with the hope that they are promoting the knowledge city concept. An analysis of projects like Egypt’s Smart Village, Dubai’s Internet City and Knowledge Village, and Qatar’s Educational City and Science and Technology Oasis is insightful in the evaluation of emerging Middle Eastern Knowledge Cities. The purpose of this chapter is to explore the knowledge city concept in depth to relate it to the ongoing processes of creating knowledge-based economy developments in major Middle Eastern cities, particularly in Arab Gulf Cities. It discusses the principles of a knowledge city, and portrays its distinguishing characteristics and processes. In addition, the chapter introduces the concept of urban creativity engines in the context of the Middle East, and presents examples of various types of creativity engines. Although this concept and its related terminologies are relatively new, the chapter proves that there are many historical examples of knowledge cities and creativity engines both regionally and internationally. A focus on the traditional built environment of the Middle Eastern cities is included to support the main argument of the chapter.

INTRODUCTION

“In the knowledge economy, human development depends not on having more but by being more—becoming a co-creator to the future of humanity”
Dr. Thomas F. Malone (1989, p. 9).

The world’s growing cities are a critical fact of the 21st century and represent one of the greatest challenges to the future. By the year 2050, cities with populations over 3 million will be more than double; from 70 today to over 150 (Wagner, 2001; Dvir, 2003). When knowledge is, perhaps,
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the most important factor in the future of a city’s economy, there is a growing interest in the concept of the knowledge city (KCs). Hence, what are the qualities of future cities becomes a crucial question and its answer creates a challenge for architects, urban designers, planners, developers, and decision makers around the world. In addition, another explosion of cross-boundary Internet activities took place. It creates a modern city management landscape that defies traditional geographical limits. It also creates a highway of networked knowledge operating in the best interest of our common good, but not on the expense of individual development. Globally, there has been an explosion of worldwide initiatives to reconsider contemporary cities as hubs of knowledge and all its related activities. It seems that the challenge of human kind in the third millennium and in a post-globalized world is how to increase the innovation capacity and performance of human settlements by creating an active community of knowledge-sensitive cities or regions that will rapidly learn from each other.

Middle Eastern cities are struggling to be part of this mechanism of change and development. Major economic changes are taking place within these cities. For instance, the wealthy Arab countries, basically located around the Arabian Gulf are becoming fully aware of the necessity for diversifying their economical bases. They have been trying to move from an oil-based economy toward a more multi-dimensional one that will help them survive the inevitable dry up of their oil resources. Other cities that are located in the rest of the Middle East also have realized that a new paradigm is approaching where the typical production of physical commodities is replaced by the knowledge production, which is based primarily on the power of human capital and the unlimited creativity. While acknowledging that coping with this new paradigm is inevitable, obviously a major confrontation with the contextual realities of these cities is a fundamental challenge.

BACKGROUND: CITIES OF THE NEW MILLENNIUM

Cities, Technology and Digital Revolution

Technological advances have shaped and continue to shape the economic and physical development of cities all over the world. During the 19th century, industrialization gave rise to manufacturing plants and factory towns, while the steam engine led to the growth of seaport cities and a system of railroads that linked cities and towns. During the 20th century, advances in transportation technology—notably the internal combustion engine and the jet airplane—contributed to the dispersion of the world’s population to suburban areas and to urban growth in new directions. Public and private sectors’ policies that financed the construction of airports and the development of interstate highways have reinforced these technological trends as well. And, of course, air-conditioning has contributed to the growth of year-round populations in what were once seasonal communities.

Today, new and emerging telecommunications technologies are transforming the economic role of cities and their pattern of physical development. Many cities have lost their roles as corporate headquarters and manufacturing centers, while others have attracted information-intensive activities, such as back offices, customer service centers, and research and development laboratories. Furthermore, rapid advances in information and communication technologies (ICTs) pose a major challenge to city-based financial, healthcare, and educational institutions, and to cities’ roles as centers for commerce and culture. ICTs are inevitably transforming societies and cities increasingly knowledge-based. The nature of city development changes accordingly as activities in the knowledge sector that are becoming more important, and they require conditions and environments that are different from commodity-based manufacturing activities (Knight, 1995).
Even the phenomenon of globalization was made possible with the advent of the digital revolution and has turned the world into a global village; and, in this era of globalization, cities are regarded as arenas of accelerating change. Sassen (1991) once referred to the four major interrelated functions that cities should perform in their attempt at becoming global. In her words, they should become “highly concentrated command points in the organization of the world economy; second, as key locations for finance and for specialized service firms, which have replaced manufacturing as the leading economic sectors; third, as sites of production including production of innovations, in these leading industries; and fourth, as markets for the products and innovations produced” (pp. 3-4).

Castells (1996, 1998) has argued that a new type of society is rising in our contemporary cities due to the consequences of the information revolution. From a sociological point of view, Sassen (2000) has argued that cities in the information age should be re-perceived as nodes of an immense network of cultural, commercial, and political transactions. Giving these points of view, it is obvious that the classical planning processes and design guidelines of contemporary cities need a substantial revision. In a world which is best described as a global village with less and less boundaries, knowledge and its physical representation in the built environment creates a major challenge and invite us to picture the vision of the 21st century cities.

In an extensive endeavor to explain the new dynamics in city formation and transformation, Sassen (2002) and a distinguished group of contributors, focused on two key issues. First, they look at how information flows have bound global cities together in networks, creating a global city web whose constituent cities become “global” through the networks in which they participate. Second, they investigate emerging global cities in the developing world—São Paulo, Shanghai, Hong Kong, Mexico City, Beirut, the Dubai-Tehran corridor, and Buenos Aires. They show how these globalizing zones are not only replicating many features of the top tier of global cities, but also are generating new socio-economic patterns as well. In global cities, urban and regional planning has displayed a recent interest in designing policies to attract foreign direct investment and encourage economic growth in KCs. These policies also focused on creating social amenities and communities to attract knowledge workers (Martin, 2001; Chen & Choi, 2004). The key factors in attracting knowledge workers to KCs are mainly social relationships and quality of life of these cities (Mathur, 1999; Leamer & Storper, 2001; Robinson, 2002; Santagata, 2002).

The Rise of Knowledge Economy

KCcs are cities that possess an economy driven by high value-added exports created through research, technology, and brainpower. In other words, these are cities in which both the private and the public sectors value knowledge, nurture knowledge, spend money on supporting knowledge dissemination and discovery (i.e., learning and innovation), and harness knowledge to create products and services that add value and create wealth. Currently there are about 70 urban development programs worldwide formally designated as KCcs (Carrillo, 2005; Pol, 2005). KCcs fall under a new area of academic research entitled knowledge-based development, which brings together research in urban development and urban studies and planning with knowledge management and intellectual capital.

The aim of developing a knowledge economy is to create value-driven relationships and value-added products and services. And one of the ways to do this is encourage innovations and entrepreneurship. The key to innovation lies in creative thinking and the generation of value-creating opportunities. The people, who have the know-how and foresight to interpret, analyze, and share information—to turn it into knowledge—are those
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who really make the difference. These people are called knowledge workers and form the backbone of the new economy—or what should really be called the “knowledge economy”.

The creation of a knowledge economy of which entrepreneurship is a key component, is hugely important to the economic growth of the Middle East. But it is vital that knowledge is transferred to and shared by locals rather than residing only with expatriated who are likely to take the knowledge outside the country as Sam Hamden, organizer of the first World Summit on Innovation and Entrepreneurship, pose the question of “What happens if the knowledge is not transferred to nationals?” While Dubai, the most important Gulf city, has some of the core ingredients required for a knowledge economy—strong government support and a well-developed physical infrastructure, the emirate has yet to put in place the legal infrastructure to protect intellectual property.

There also are issues related to social structure and cultural values. For the knowledge economy to flourish, especially small-to-medium size enterprises and micro-enterprises, you need a middle class. The importance of this class for flourishing local economy is not always appreciated and encouraged in the Arab world. Creating opportunities for local-level business to interact with international corporations is hugely needed. If innovation is to flourish, and the knowledge economy thrives, people and organizations also must be prepared to take more risk. Risk-taking is not encouraged in the Middle East and this needs to be addressed. Transparency, risk-taking encouragement, access to financing, good governance, and educated workforce are all critical to the development of the Arab world’s knowledge economy.

What Is a Knowledge City?

KC’s play fundamental roles in knowledge creation, economic growth, and development. Edvinsson (2003) sees KC as a city that was purposefully designed to encourage the nurturing of knowledge. The notion of KC is interchangeable to a certain degree with similar evolving concepts, such as “knowledge-based clusters” (Arbonies & Moso, 2002), “ideopolis” (Garcia, 2004), or “technopolis” (Smilor et al., 1988a; Smilor et al., 1988b; Dvir & Pasher, 2004). KC also is seen as an umbrella metaphor for geographical entities, which focus on knowledge creation and covers other knowledge zones such as “knowledge corridors,” “knowledge harbors,” “knowledge villages,” and “knowledge regions” (Dvir, 2003).

Ergazakis et al. (2004) refer to KC as a city that aims at a knowledge-based development, by encouraging the continuous creation, sharing, evaluation, renewal, and update of knowledge. This can be achieved through the continuous interaction between its citizens and also between them and other cities’ citizens. The citizens’ knowledge-sharing culture as well as the city’s appropriate design, ICT networks and infrastructures support these interactions.

Apparently, the previous definitions are suggesting a multi-layered concept that involves developing a path toward a more viable, vibrant, and sustainable development. KC’s have embarked on a strategic mission to firmly encourage the nurturing of innovation, science, and creativity, within the context of an expanding knowledge economy and society. In this regard, a KC can be seen as an integrated entity, which physically and institutionally combines the functions of a science park including civic and residential facilities. It offers one of the desirable paradigms for the sustainable cities of the future.

KC’s are seen as fundamental to the economic growth and development of the 21st century and a new perspective of development that are based on knowledge, innovation, and creativity. Leif Edvinsson (cited in Dvir, 2004, p. 2) defines KC as “a city that is purposefully designed to encourage the nurturing of knowledge.” KC is not just a regular city. It is a growing space of exchange and
optimism in which each and everyone can devote himself to personal and collective projects, and aspirations in a climate of dynamism, harmony, and creativity. What is unique about this definition is the focus on KC as a holistic environment for comprehensive development. Hence, it calls for a different process of articulating the city’s structure, and subsequently raises issues and concepts like transparency, democracy, and sustainability. It also is suggesting new paradigm in city planning. Based on knowledge-based development, Carillo (2005) shows how knowledge can be and is placed at the center of city planning and economic development to enable knowledge flows and innovation to provide a sustainable environment for high value-added products and services.

Principles of a Knowledge City

The revolutionary transformation of knowledge has been made possible with the revolution in electronics which, in turn, has made the digital world a reality (Sassen, 1991). This major innovation has led to as many transformations as possible in almost all aspects of life; cities, as arenas of accelerating change, not excluded. Hence, concepts such as digital city, dot com city, Internet city, intelligent city, global city, and KC are the by-products of these radical and unavoidable changes. In a narrow sense, “KC would mean a city where the fruits of the IT Industry are applied to run it. In this regards, the management and monitoring of the city was pioneer. However, in contrast to this narrow perception of KC, there is another view which claims that KC is not a novel phenomenon and there are many historical examples of KCs and innovation engines” (Dvir, 2003, p. 1).

In a visionary attempt to provide general guidelines of KC establishment, The Kaieteur Institute for Knowledge Management (KIKM) and ENTOVATION International. (www.entovation.com), have published 10 principles that govern the holistic formation of a KC (Table 1).

Although the principles given in Table 1 were strongly interconnected, only four of them are taken into consideration to form the main argument of this chapter. These four principals that are more prone to the contextual conditions of Middle Eastern Cities are as follows:

1. **New growth medium**: Knowledge-based urban development is the perfect new medium for cities to grow more livable, stimulating, cleaner, intelligent, tolerant, and to empower their communities.

2. **Knowledge fusion**: The KC is the culmination and synthesis and reintegration of the creative city and the science city where arts and sciences become unified in uniquely human 21st century urban ecology. To focus on one without the other would not be a right choice.

3. **Boundary-less intellectual capital**: The KC, though it may be grounded in space and time, is ultimately unbounded by space

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<tr>
<th>Table 1. Formation principles of a knowledge city (based on KIKM and ENTOVATION Int.)</th>
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<td><strong>Formation principles of a knowledge city</strong></td>
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<td>Knowledge purpose</td>
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and time, and this gives it greater potential global richness and reach.

4. **Knowledge governance:** In an era where there is growing unease, dissatisfaction, and distrust in current governance regimes, the KC can facilitate new forms of citizenship in which openness, transparency, accountability, and recall, replace fear, cynicism, fraud, and the knowledge gap expressed so often in “who knew?”

It is obvious that these elements are stressing fair distribution of knowledge within cities and their citizens as oppose to creating isolated, gated, and excluded centers for knowledge. The crucial point is the fact that KCs are about engaging the whole community not limited and selected sectors only. This specific criterion is used in the following sections focusing on evaluating emerging KCs in the Middle East context.

**Characteristics of a Knowledge City**

What makes a KC perform optimally? The following list is compiled as a result of analyzing the published criteria by the Latin American Knowledge Development Forum (LAKDF), Monterrey, Mexico (2003), and by the ENTOVATION 100, Barcelona, Spain (2004):

- A city that has instruments to make knowledge accessible to citizens.
- A network of public libraries that is compatible with the European standards.
- Access to the new communication technologies for all citizens.
- All cultural facilities and services with a central educational strategy.
- A city that has a newspaper- and book-reading level that is similar to the average European level.
- A city that has a network of schools connected with artistic instruction throughout its territory.
- A city that is respectful of the diversity of cultural practices of its citizens.
- A city that places the streets at the service of culture.
- A city that simplifies, through the provision of spaces and resources, the cultural activity of the community collectivizes and associations.
- A city with civic centers that are open to diversity and that foster face-to-face relations.
- A city that makes available to citizens from other territories all the tools required for them to express themselves.2

What makes the above-list important to the main argument of this chapter is related to its formulation. In some aspects, Latin American context is very similar to the Middle Eastern one. For example, issues like poverty, unemployment, illiteracy, human rights, corruption, and severe environmental degradation are among general issues that can be easily traced in both contexts. The second point about this list lies in the comprehensiveness of its structure. It covers the whole spectrum of the relation between knowledge and city, including levels of generating, disseminating, and fairly distributing its creative outcomes. Nevertheless, it is important here to acknowledge the understanding of a need for contextualizing these characteristics to cope with the local conditions of a specific city within a particular context.

**THE EMERGING KNOWLEDGE CITIES: INTERNATIONAL ATTEMPTS**

It is estimated that by 2030, 60% of the world’s population will be living in cities (Wagner, 2001). As KCs creating skilled employment opportunities and economic growth, much of the urban development would occur around them. The major role of a KC is to provide its citizens
with enabling conditions that foster knowledge creation, exchange, and innovation.

Cities around the world have acknowledged these new urban conditions for their future success and prosperity. There already are a number of cities that identify themselves as KCs, or have strategic plans to become KCs (Pol, 2005). These cutting-edge cities are aiming to win competitive and cooperative advantage by pioneering a new environment and knowledge ecology for their citizens. According to the Knowledge Cities Observatory (KCO) classifications, a list of world KCs (www.entovation.com) includes examples like:

- **Melbourne, Australia**: Its strategic plan for 2010 emphasizes the path toward enhancing its position as a KC.
- **Delft, The Netherlands**: The city clustered its knowledge-intensive projects included in the “Delft KC” initiative in five themes: soil and water, information technology, innovative transport systems, and environmental technologies.
- **Barcelona, Spain**: The activity of Barcelona Forum 2004, which manifests the cultural perspective that Barcelona adopted as a main theme for its knowledge-sensitive development (Marshall, 2004). Accordingly, the city was chosen to host the founding meeting of the distinctive KCO.
- **Palmerston North, New Zealand**: This relatively small city puts education in the heart of its “KC” manifest.
- **Monterrey City, Mexico**: The new governor set the goal of becoming a KC among his top five priorities.

This short list shows how the concept of KC is spreading successfully to different geographic, cultural, social, and economical contexts around the world. It also shows that this pioneer generation of KCs is well-diversified in terms of geographical locations, sizes, resources, political structures, and more importantly, visions for establishing its new identities. Melbourne’s experience as a KC needs to be further analyzed. Melbourne’s initiatives on science, technology, and innovation and policies for economic and social development are setting an example for the holistic process of establishing KCs worldwide. It also illustrates how the city administration played a key role in developing Melbourne as a globally recognized, entrepreneurial, and competitive KC (Dovey, 2005; Yigitcanlar, 2005).

**MIDDLE EASTERN CITIES AND KNOWLEDGE ECONOMY**

**Arab Cities in a Post-Globalized World: New Centres Emerged**

Cairo, Baghdad, and Damascus used to be the intellectual, cultural, social, and political centers for the Arab and Islamic world. These cities have structured the models of development to be followed in the Middle East. Even after the Gulf’s oil boom back in the early 1970s, they have been able to maintain their leading capabilities. Historically, Cairo exercised strong influence on the whole region of the Arab world. This influence can be traced culturally, politically, socially, and architecturally (Mitchell, 2002; Sakr, 1996). However, the city is losing its regional leading role. Cairo’s status is a reflection of Egypt’s struggles to cope with problems caused by massive population growth, urban sprawl, economic failures, and growing poverty rates. Due to long conflicts and the complexity of their recent political and economical situations, both Baghdad, and Damascus lost their capability of sustaining their sense of leadership. Hence, Cairo is left alone as the only old center struggling to maintain and develop its previous status.

Alternatively, in the last two decades new centers in the Arab/Middle Eastern region are emerging. Cities like Dubai, Doha, and Manama are creating new models of development that
are so fresh, prompt, and dynamic. Within this perspective, Dubai constructs a very interesting and vivid experience. In the last 10 years, and at a remarkable pace, it has developed into a global crossroads, and is now thriving on a new type of post-global condition (Figure 1).

Dubai’s new cityscape is emerged through the implication of a set of developmental models that emphasizes the global nature and aspirations of the city. Creations of icons in Dubai or, namely “Iconic Developments,” seem to be the governing strategy for all its current and upcoming projects. Hence, projects and buildings are becoming urban brands waiting to be exported and then consumed by other Arab and Gulf cities in their strive to join the new world order. This process can be best described as the “Dubaization” of contemporary Middle Eastern cities. Dubaization, in this context, refers to the urban impact of Dubai; the most popular Arab city in our time. Many Arab cities are competing to imitate Dubai in its unprecedented effort to build the tallest, the biggest, and the largest ever built architectural and urban iconic projects. Dubai, in this sense, is becoming an urban brand that was successfully marketed within its regional boundaries.

**Iconic Development and Real Estate Fantasies**

The outstanding oil sales revenues have accumulated in the Gulf countries due to unprecedented increase in oil prices. When the price of the barrel reached $70 in 2005, the way was paved for an economic revolution that started with the real estate boom. In addition, a lot of gulf financial capitals saved in American and European banks were withdrawn and redirected locally as a consequence of 9/11 culture of fear. Fear of embargo, assets freezing, or severe punishments on Arab and Muslims has urged considerable number of Gulf’s most rich people to invest locally. Real estate was an ideal answer for the exceptional presence of liquidity in Gulf/Arab modern history.

*Figure 1. Dubaization; the emergence of a new urban brand for Middle Eastern cities (www.alnakheel.com)*
If we focused more on the rapidly developing Gulf Cities, one will be astonished with the pace and the volume of the Dubaization process throughout Gulf cities. Even outside the boundaries of United Arab of Emirates (UAE) where Dubai is located, a set of projects that are based on concepts of iconic development borrowed from Dubai are emerging all over the Gulf. To name a few, one can mention Desert Islands, Al Riyadh Island and Venice Islands in Saudi Arabia, The Blue City in Oman, Durrat Al-Bahrain Lulu Islands, Financial Harbor (Figure 2), and Amwaj Islands in Bahrain, Pearls of Qatar in Qatar, and more recently, Silk City in Kuwait.

These projects are the most recent packaged residential environments in the Gulf, their different themes and design concepts, as well as the different amenities and services allow inhabitants to engage in a Hollywood-like lifestyle. The supremacy of image, projected in the media and promoted internationally through technological advances in mass communication, has resulted in the construction of global architectural fantasies and the pursuit of planning whims that offer no local identity or sense of contextual authenticity. One problem of the rapid urban growth in cities like Dubai and its followers is the creation of what demographer William Frey calls “gated regions” in which both the city and many of the surrounding suburbs have become unaffordable for all but the very wealthy. This development tendency, however, is contradicting the main principles and promises of KCs. The spread of such gated regions and communities is antithesis to its commitment to creating KCs.

Middle East’s 21st Century Economic Challenge: Post-Oil Paradigm

In the face of the growing competition between countries, cities, organizations, and individuals, a new way of thinking is required if all are to achieve economic success. To date, many of the Middle East countries have been fortunate. They are oil-rich states, although reserves are dwindling.
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and have been able to use oil revenues to develop projects to diversify their economies. The grand plan for most of these economies is that they will become knowledge-based, which means that the service sector will become more important. Consequently, the need for governments to educate and nurture local talent will become paramount, and they will need to encourage people to think differently. In other words, shifting toward a knowledge-based economy is becoming a necessity rather than an optional development direction. Gulf countries are constructing a very clear case in the relevance of knowledge-based development in the post-oil paradigm.

United Arab of Emirates and Kingdom of Bahrain among the rest of the Gulf countries were pioneers in releasing that moving from an oil-based economy to a more diversified one based on knowledge economy and service industries is a difficult shift yet inevitable. Dubai, as an example, being the most important emirate in UAE, accomplished this successfully in terms of its economic diversification, which helps its standing as a model for other countries in the region. Unfortunately, the level of local community involvement is extremely limited. Yet, as the city continues to evolve, its model of development has to be comprehensively reevaluated. Moreover, the important question here is that how sustainability of this model can be achieved when the Emirate’s development and management is controlled mainly by foreign investors?

KNOWLEDGE CITIES/ZONES: REGIONAL ATTEMPTS

In a post-global post-oil paradigm, most of the Middle Eastern cities are thriving into diversified economic industries. Knowledge economy was perceived by both leaders and intellectuals as a valid vehicle for bridging into the new paradigm. Gulf cities are working hard in this direction. Huge investments that were used in the last five years to finance iconic real estate developments, are now shifted to planning and financing of knowledge-based economic centers’ development. Additionally, an unprecedented concern regarding the production and dissemination of information and knowledge are rising within all of those cities.

This section evaluates the conditions for constructing KCs in the Middle East by using a comparative analysis approach. The cases of Gulf Cities and Cairo illustrate a major shift in their development strategies for these cities to become KCs. It examines these projects that were promoted and initiated with a new label of KC. Projects like Dubai’s Knowledge Village, Qatar’s Science and Technology Oasis, Bahrain’s Technology Park, among others, are analyzed in order to reach a comprehensive understanding of KC experience within the Middle East context, in general, and the Gulf cities, in particular.

The Middle Eastern cities require major social transformations that would be regarded as preconditions toward the creation of KCs. Furthermore, based upon what has been put forward earlier, the rest of the chapter is devoted to spelling out the required preconditions or prerequisites from the aforementioned projects. In this sense, sustainability and citizenship should be regarded as the most important strategies in the development of future KC initiatives.

In an attempt to realize the high-performance KC, different initiatives took place in some of the Middle Eastern cities. Egypt, UAE, and Qatar are pioneers among other Arab countries in trying to inject knowledge entities into the structure of their major cities. Cairo and Dubai are witnessing a major development in this direction, which results in a variety of projects where knowledge is a substantial component of their identity.

Despite the comprehensive strategic planning of European and American KCs and the successful implementation of KCs formation principles, Arab cities are building technologically advanced but isolated projects. This is considered as an
attempt toward claiming a new identity for its contemporary cities as KCs. An examination of projects like Egypt’s Smart Village and Media City, or Dubai’s Internet City and newly launched project Knowledge Village is useful in evaluating the KC status of contemporary Arab Cities. Experiences and lessons learned from developed world KC initiatives are essential to be used as a benchmark for such an evaluation.

While in the case of Dubai and Cairo, those isolated projects are neither facilitating the creation of a KC nor transforming their parts into knowledge nodes. As mentioned earlier, contrary to the global applications of KC principles, the Dubai and Cairo models were more centralized and divorced from the real community. Both the Media City (DMC) and The Knowledge Village (KV) projects in Dubai fail to construct a knowledge pole (Alraouf, 2005). The former is becoming the headquarters of foreign media agencies and the latter is transformed into rental property for universities, colleges, or training centers. Sam Hamden (Gulf Times, March 17, 2006), organizer of the first World Summit on Innovation and Entrepreneurship, criticizes Dubai’s model of knowledge economy by stating that “The industry clusters are more like business parks and are not innovation clusters.”

Conceptually and architecturally, Dubai Internet city is a unique piece of development that was established in the Dubai Technology and Media Free Zone—a tax-free commercial site set up to support the development of knowledge-based industries. Aside from Dubai Internet City, this Free Zone includes separate clusters for the media and education industries. Over the past three years, Dubai Internet City has been developed to provide a complete business and community infrastructure for ICT companies. There are now 16 office buildings in Dubai Internet City—with an 80% occupancy rate. The buildings are set amidst an exquisitely designed landscape of lakes and gardens, which are all open for public and community members either locals or expatriates alike. Dubai Internet City is home for about 1,200 companies. Dubai Internet City accounts for more than 10,000 knowledge workers. In addition, there are 220 luxury residential villas. Continued growth will see these numbers rise—construction is soon set to begin on 14 new high-rise towers.

Cairo’s experience in building Smart Village was not successful either. The project was allocated almost 40 km away from the city centre and was designed to communicate a high-tech architectural statement. The reality of Smart Village shows that the concept of a community knowledge center was totally abandoned. In addition, the public access and allocation of open spaces were denied. Therefore, the village is totally isolated from both the city and the community. Even architecturally, a naive reproduction of Pharonic (Ancient Egyptian) architecture was created. Although international giants like Microsoft and other major ICT companies moved their local headquarters to the project site, their presence stressed more on the isolated nature of the project (Alraouf, 2005). Security issues are becoming a top priority, especially when two years ago the Egyptian Ministry of Information and Communications moved to the village’s central zone. The conceptualization of the Smart Village as it is totally abounded with an imitated Pharonic architecture. In addition the public access and use of open space was not permitted.

Among the analyzed case studies Doha, Qatar, is a more successful example in its incorporation of knowledge within the city. Governments in the Gulf need to develop the “social infrastructure”—educational institutions and environments that foster innovation—on which knowledge economy is based. People must be given a platform from which to innovate. In this direction, Qatar’s experience can be seen as a very positive example. Both of its mega projects in the knowledge economy are creating interactive centers for knowledge production and transfer. Science
and Technology Oasis and Education city are two projects that deserve considerable attention and further analysis.

**THE NOTION OF KNOWLEDGE IN TRADITIONAL ISLAMIC/ARAB CITIES**

This section discusses the notion of knowledge that is historically embedded in the overall structure of traditional Arab cities. For example, traditional cities in Egypt, Iraq, and Syria were evolved as arenas for knowledge exchange. Therefore, an attempt to foster this concept in today’s Arab cities would not be possible by building isolated technological precincts scattered around the city. Alternatively, the rise of the network society, global networks, linked cities, and existence of smart communities should construct the basis for emerging Arab knowledge cities.

A close examination of the urban and architectural structure of a typical Islamic/Arab city reveals that many of the city’s experiences were based on exposing community members to knowledge either consciously or subconsciously. Three main building types can be used in the context of this chapter to illustrate how the physical built environment was positively supporting a very distinguished relation between city and knowledge. These buildings are: the Mosque (Al-Jameea), the School (Al-Madrasa), and the Market (Al-Souq).

Mosques like Sultan Hassan in Cairo or Al-Mustansarya in Damascus are excellent examples in showing how knowledge and spirituality were interconnected. The Mosque was perceived intellectually and spiritually as a gathering place in a traditional Islamic city. It is a house of God, where Muslims can enrich their souls and minds in a peaceful environment. Yet, it used to be an arena for constructive debates and heated dialogues. Additionally, the school, as a knowledge entity, integrated gradually with the mosque’s environment and has acquired a physical presence in the spatial composition of the traditional cities’ mosques, which resulted in an interesting balance between main domains of knowledge—the sacred and the secular. Sultan Hassan and Al-Mustansarya are the perfect cases where the mosque and the school were physically integrated to form an accessible, hence, democratic knowledge centre. Additionally, those centers show the highest degree of tolerance by including the different Islamic schools of thoughts and doctrines within the same knowledge entity of the Madrasa.

The Souq has always played an important role in the economic and social life of the traditional Middle Eastern city. In the broadest sense of the term, the Souq is an organized system grouped into guilds. In most of Souqs, which are located in Islamic cities, the shops usually are grouped by profession; thus, one alleyway may be occupied by carpet sellers, another by goldsmiths, and yet another by coppersmiths (Figure 3). It acts as an interface between the town and the country, and has close links with the clergy. The economy of scale provided by Souqs is an excellent opportunity to exploit tacit knowledge especially for the young generation.

Discussing such urban and architectural entities, which have been responsible for knowledge dissemination in traditional Islamic cities, is not a nostalgic claim. Yet, it is a remark for Arab planners, architects, and decision makers to examine the relevance of their heritage to contemporary issues.

**TOWARD A CONTEMPORARY MIDDLE EASTERN KNOWLEDGE CITY**

The question still remains: How to turn contemporary Middle Eastern cities into KCs? KC is a comprehensive concept, it is a medium where knowledge is produced and spread all over its structure. Hence, a need to shift Arab/Gulf cities
strategies toward creating a holistic KC rather than scattered, fragmented and isolated projects is fundamentally required. Contemporary Middle Eastern cities have great potential to be transformed into KCs. Two important challenges need to be faced. First, how those cities will be able to capitalize on its historical urban patterns that made some of the old Middle Eastern cities very successful. Second, a need to formulate a conceptual foundation for the establishment of a KC is highly needed. To answer such difficult questions, and in an attempt to draw a tangible conclusion for this chapter, the concept of urban creativity engine is discussed within the context of Middle Eastern cities. The following section explores this concept and its reflection on urban planning and design in the emergence of Middle Eastern KCs.

Urban Creativity Engines

For creativity and innovation to be nourished in contemporary cities, a set of urban, cultural, and social patterns are needed to be activated throughout to be knowledge cities. Those patterns can shape the urban form and the social life in a way that transforms cities into KCs. The intellectual approach and innovative concepts of Ron Dvir (Dvir, 2003, 2004) will be highly referred to and examined in the light of the Middle Eastern context. The intention is to be able to appropriate Dvir’s concepts to fit the Middle Eastern cities. In addition, to generate other concepts from within this context unique history and traditions.

Creativity is the process of turning knowledge and ideas into value. An urban creativity engine is a system that can trigger, generate, foster, and catalyze creativity in the city (Dvir, 2004). Typically, it is a complex system that includes people, relationships, values, processes, tools, and technological, physical and financial infrastructure. A close examination of the constructs of a typical city reveals that many of the city’s facilities, like schools, parks, or libraries, can serve as creativity engines. However, not every university, or library, or industrial district, for example, plays the role of a true creativity engine. There is always a unique combination of intangible factors that turn a spe-
Specific ordinary urban construct into an innovation engine. This set might include, for example, a strategic intention, an explicit vision to use it as a creativity engine, exceptional leadership, and devoted special team.

**Smart Patterns for a Middle Eastern Knowledge City**

Four creativity engines: the café, the library, the museum, and the university, are selected to illustrate how urban institutions can be transformed into essential part of the KC network. The existence and the social, cultural, and architectural articulation of these institutions in Middle Eastern cities would facilitate the emergence of smart urban patterns that will construct the overall holistic structure required for the KC establishment. However, the concluding remarks of the chapter suggests other urban facilities to serve as creativity engines. This specific fact stresses the endless and timeless nature of creativity engines. In addition, it indicates the freedom and the flexibility of organizing and synthesizing them into a more holistic city form.

**The Café: Internet Café vs. Gahwa**

The first innovation engine that emerged in traditional cities is the good old café, since knowledge and ideas are created mainly through conversations. Historically, cafés provided stimulating environment for rich conversations, which led to the creation of exchange of provocative ideas and breakthroughs in diverse areas, such as arts, philosophy, psychology, and politics (Figure 4). For example, many of the influencing ideas of the 19th century were created at the cafés of Wien and Paris. In the Middle East, the traditional café is disappearing under the pressure of the newly spread Internet cafés. A need to reintroduce the knowledge café (Gahwa) in the contemporary Middle Eastern cities is highly recommended. This pattern might overcome the negativities of Internet cafés, which are pushing community members more into isolation and individuality.

**The Library: Knowledge for the Public**

Great libraries are not only about archiving the intellectual achievements of past generations, but
they also can serve as a place for innovation, for example, the ancient library at Alexandria, which for a thousand years had been the western world’s most important center of learning. The Alexandria library was nothing less than a summit of ancient scholarship. Its archives and museum were filled with the intellectual heritages of Mesopotamia, Persia, Greece, Rome, and Egypt, and its research center was visited by many generations of scholars seeking to stimulate their minds and keep alive memories of the past. Today, in an event that speaks of renewal, Alexandria is trying to recapture the spirit of perhaps its richest legacy—the Great Library of Alexandria—by opening the new Bibliotheca Alexandrina.

The Museum: Culture for the Public

Like libraries, great museums not only show past cultural achievements but also serve as hosts and stimulators of innovation in diverse arts fields, as well as in other areas. One of the best examples is the Guggenheim Museum at Bilbao, Spain, an important attractor in the redevelopment plan of the city of Bilbao, transforms this old industrial town into a KC. Since it opened its doors in 1997, the museum hosted not only art events but also many conferences in business innovation, intellectual capital, and similar domains. The case of the Islamic Museum in Qatar is rather interesting. The Jordanian architect, Rasem Badran transcends the typical role of the museums in the Middle East as protected showcases for art objects to more interactive spatial qualities where the public spaces, gardens, and open spaces are the most important ones. A museum is becoming a destination for the community rather than an isolated place for the elite.

The University: Knowledge Community Link

The University of California, Berkeley in San Francisco, the colleges of Oxford, MIT, and Harvard at Boston, Le Sorbonne in Paris are some of the world’s top universities. All are fine examples of the scale, quality, and different kind of innovativeness that a good university can contribute to a city. In all visions and strategic plans of KCs, the local universities play an instrumental role. It is not enough to nourish the academic excellence of the university. The multi-faceted links between the university and the city citizens—children, teachers, business people, artists, industrialists, and so forth—turn the university from a learning and research center into an innovation engine. Paradoxically, in the case of University City in Sharjah, UAE, the educational center is isolated physically and intellectually from the city. Although the city is accommodating two very important universities in the Gulf—the American University in Sharjah and Sharjah University—yet, failing to consider the important role that the university should play in dissemination of knowledge in its community is a major explanation for its negative role as a knowledge centre.

Endless/Timeless Creativity Engines

How can cities turn other urban places and institutions into engines for creativity? According to Dvir (2003), creative thinking based on collaborative efforts of all stakeholders—citizens, business people, policy makers, educators—can lead to interesting answers for fostering creativity and knowledge. Every part of the city should be seen as a potential for fostering creativity and encouraging knowledge transfer. Therefore, creativity engines cannot be perceived as isolated entities. This fragmentation is against the main principles of forming a KC. Yet, a more holistic approach is recommended by which the city will be engaged in a comprehensive approach of developing its identity. In this sense, creativity engines are endless because they can range from a kindergarten to the city center. They are also timeless because they are building on the history and traditions,
and revitalize old patterns and activate their roles in contemporary knowledge cities.

CONCLUDING REMARKS

Knowledge cities should be perceived as the opportunity for new sustainable growth and prosperity in the global knowledge economy. Therefore, the emerging KCs in the Middle East should be seen within a regional and global knowledge network. The ultimate goal is to increase the innovation and creative capacity of cities based on a new set of knowledge patterns.

The making of a KC is a long and complicated process, but for sure it is the path to follow for achieving sustainable urban development. Examples of KC best practices can be guidance for cities that are willing to pursue knowledge-based development. However, it should not be forgotten that each city is unique and characterized by different cultural, economic, and political conditions. Therefore, KC strategies need to be customized to the unique urban circumstances, competencies, opportunities, and challenges.

A KC is a place where the outcomes and by-products of information technology are widely available to all. The physical configuration of the city would educate the people, and even by just living in the city they would absorb the manifestations of culture. Facades, landscapes, city elements, and so forth, are designed and arranged in such a way to remind residents of the cultural presence. Moreover, well-equipped cultural centers evenly distributed throughout the city would be available to all without exception.

For the establishment of contemporary KCs in the Middle East, two integrated conditions are required. The process of creating Middle Eastern KCs should be shifted from focusing on creating isolated and separated knowledge centers to a process by which a knowledge network is established and shared by different sectors of the community. Additionally, a comprehensive examination of the history of Islamic and Middle Eastern Cities is urgently needed to provide contemporary planners, urban designers, and architects with tools and patterns that were used successfully to disseminate knowledge in traditional built environments. Research also is a prerequisite of a KC. It requires research infrastructure, an issue that has not been developed in the Middle East. Hence, an inclusive initiative to prepare the grounds for a major transformation must be translated into a strategy.

An active community of knowledge-sensitive cities or regions will learn from each other. The precondition for participation is the willingness to share the experience with other members of this unique community. Therefore, a network between Middle Eastern cities needs to be established to facilitate the following:

- Creating annual events that can perform as platforms for mutual learning between cities.
- Creating and sharing of a set of comparative indicators that enhance understanding and provide a credible mechanism for evaluating the progress of a KC.
- Best practices exchange.

FUTURE RESEARCH DIRECTIONS

Observing the current status of Middle Eastern cities, particularly Gulf cities, precisely reveals the fact that they are entering a new paradigm. The process of moving from oil-rich states to knowledge-based economies has just started. The objective of developing a knowledge economy within these cities is clear and well-declared. Yet, when and how the transformations will take place are crucial research questions. Although contextual differences are so radical, most Middle Eastern cities have a lot in common, primarily, language and religion. Some future research should be geared toward understanding how political, cul-
tural, social, and economical factors will facilitate or rather hinder transforming a Middle Eastern city into a KC.

Another key research area can be related to demographic structure. During the last decade, Gulf cities became poles of attraction for people coming from almost every part of the world to generate more income and secure their futures. Labor forces from different levels, backgrounds, and ideologies are pouring into these cities. Hence, cities like Manama, Doha, and Kuwait have reached a percentage where up to 40% of the overall populations are expatriates. The situation is more serious in Dubai, United Arab of Emirates, where more than 85% of the population is expatriates. Research questions how newly emerged Gulf knowledge cities will engage their inhabitants positively and creatively. KCs main principles like equity, transparency, human rights, and rights to minority groups should be reinterpreted in the light of the existing yet controversial Gulf cities demographic structure. Furthermore, the relation between establishing KCs and the unprecedented real-estate boom also is an excellent future research potential. Finally, an essential route for future direction in research is related to establishing the legal infrastructure to protect intellectual property. Without well-defined rules and regulations, people will be discouraged from innovation and creative contributions.

REFERENCES


Emerging Middle Eastern Knowledge Cities: The Unfolding Story


**ADDITIONAL READING**


Emerging Middle Eastern Knowledge Cities: The Unfolding Story


ENDNOTES

1 The organizer of The Summit, which was held in Muscat in the Sultanate of Oman (1-3 April, 2006), was interviewed earlier by Lucia Dore, senior corresponded of *Gulf Times* (March 17, 2006) where he has highlighted the need to make innovation and entrepreneurship a way of growing developing countries.

2 http://www.bcn.es/acentcultura/angl/we-bang.doc, www.gurteen.com

3 While oil has historically been the main trading commodity of the region, the UAE recognized that this natural resource would not last indefinitely. A new direction was required. The Crown Prince of Dubai, His Highness General Sheikh Mohammed bin Rashid Al Maktoum, initiated an economic transformation by launching several ventures to diversify the economy. His initiatives created high-tech, zero-tax business environments for the world’s leading companies.

Chapter XV
Creation of an Australian Knowledge Town: A Case Study of Sippy Downs

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ABSTRACT

This chapter presents an Australian case study of the planning and implementation of a new university town (Circa, 1994). It aims to evaluate the effectiveness of normative urban/regional planning practice applied locally to create a regional knowledge hub. The evaluation process surveys key stakeholders’ perceptions about the town’s development using traditional methods (e.g., SWOT) and alternative methods from the Futures Studies field (causal layered analysis). The case study shows that a regional governance framework with collaborative partnerships focused on place management and infrastructure delivery is needed to realise Sippy Downs’ vision as a knowledge hub. It also demonstrates that a holistic policy framework for the town’s development also is needed to leverage the drivers of successful knowledge-based urban development.

INTRODUCTION

This chapter describes an Australian case study of planning/urban design practice, as enacted at the local level by key stakeholders. The context is the design and creation of a new master-planned community with a focus on knowledge-based urban development. The purpose of the case study was to assess the degree to which normative urban/regional planning as applied on the Sunshine Coast is effectively responding to the desire for and creation of a new town and its business activity centre, based on the global knowledge economy. The current discussion combines three aims. The first of these is to share experiences of knowledge-based urban development (KBUD) applied within a regional context for a local town centre, rather than for an emerging world city.
Creation of an Australian Knowledge Town: A Case Study of Sippy Downs competing in the knowledge economy (Figure 1). Second, this chapter seeks to identify new methods garnered from the Futures Studies field to evaluate the potential of urban planning to deliver knowledge-based urban development. The final aim of this research is to discuss the role of knowledge in shaping the spatial form of urban development, specifically its relationship to New Urbanism’s design principles and community engagement processes.

The research objectives of the case study are as follows. First, it seeks to identify the driving forces, systemic factors, aspirations, and frameworks of successful KBUD for the Sippy Downs town centre, as experienced from the perspectives of the key stakeholders. These forces and concerns may be shared or be in conflict, thus, exposing the level of effectiveness of the planning practices and partnerships. Second, the case study examines the capacity of urban planning to facilitate the transformation of a green field site into a knowledge town. Third, this study asks whether there is a relationship between the urban design and spatial form principles of New Urbanism and the development of knowledge hubs.

The research objectives were addressed using a critical discursive analysis, applying the causal layered analysis (CLA) method from the Futures Studies field to critique the current development of Sippy Downs town centre. CLA involves deconstructing the relationships between the litany, systems, worldviews, and myth/metaphors of the key stakeholders of the knowledge-based proposed town centre. Data for the CLA was collected through interviews with the key stakeholders. A set of strategic questions was used to elicit their problem/solution definition statements, driving forces, systemic factors, and deeper aspirations for the development of the future town centre/technology precinct. The conclusions of the CLA generated

Figure 1. (a) Global context location map; (b) South East Queensland Region context map overlaid onto Local Government Areas (Queensland Government Office of Urban Management, 2005, pp. 64, 73) (© 2005, Queensland Government Office of Urban Management. Used with permission.)
a map of the critical causal relations for successful KBUD in this local case. The causal layered analysis was then followed by an assessment of the policy frameworks and planning practices being implemented in the development of Sippy Downs. The assessment process used an “integral meta-framework for holistic city development” (Daffara, 2007) to evaluate stakeholders’ policy capacity to create a knowledge town that also is sustainable.

By the end of this chapter, readers should have: (1) understood the critical factors for creating a knowledge town in practice; (2) become aware of alternative methods and frameworks to evaluate or improve the strategic planning potential for the development of knowledge cities; and (3) clarified the role of knowledge in shaping the form of urban development by reconciling local community tacit knowledge about future town character and technical knowledge in terms of New Urbanism’s design principles.

BACKGROUND

Sippy Downs was formerly a coastal hinterland area for rural production (primarily grazing and cane farming) centrally located on the Sunshine Coast near the boundary between two local government authorities—Maroochy Shire Council (MSC) and Caloundra City Council. The Sunshine Coast is a region 90 kilometers north of Brisbane (Figure 1b, Figure 2) currently experiencing a values and lifestyle-based population migration termed the sea change (Salt, 2003, pp. 58-61). Evidence collected by the Globalization and World Cities (GaWC) Research Group shows that Brisbane has the potential to emerge as a globally networked World City—though its status within the network is far behind the Alpha World Cities (e.g., London), Beta World Cities (e.g., Sydney), and Gamma World Cities (e.g., Boston) (Taylor et al., 2002, p. 100).

The urban planning history and development of the new Sippy Downs Township and its precincts spans 13 years, a relatively short period in terms of global urban evolutions. In 1994, planning approval for a 300ha master-planned residential community, Chancellor Park, coincided with the acquisition of 100ha of adjoining land for a new regional university for the Sunshine Coast. After two years of planning and development, the University of the Sunshine Coast (USC) opened on February 26, 1996 with 524 students. The seeds
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of the vision for a University Town emerged from the USC Master Plan (1994) and community forums, which emphasized community engagement between the university and the region. The University of the Sunshine Coast planning committee urged the Queensland state government to provide a forum for advancing a coordinated planning study for the new town in the form of a development control plan. The study produced the Sippy Downs Development Control Plan gazetted in 1997 to guide the anticipated rapid development of the town, which was forecast to support 25,000 people. The Development Control Plan (DCP) provided an urban structure plan to ensure the future town centre would be integrated with the university campus in a complementary and cohesive way. At that time, the regional planning approach between the state and two local authorities did not focus principally on the creation of a knowledge node within the global economy, but mainly on orderly urban development and its design. The DCP provided the basis for the original township structure plan that was incorporated in council’s planning scheme, known as the Maroochy Plan 2000.

Due to changing political and environmental contexts the DCP was followed by two other studies. First was the Sippy Downs Town Centre Urban Design Master Plan and Transport Study, completed in 2000. It provided the basis for the Maroochy Planning Scheme amendments that came into effect on May 7 2002, and included a Sippy Downs Town Centre Development Code, revised planning area intent statements and revised town centre precinct boundaries and development provisions. The second study, the Sippy Downs Town Centre Master Plan Review, was conducted in 2006 and completed whilst this case study was being undertaken (Figure 3). The 2006 review was triggered by a number of regional planning initiatives including the South East Queensland (SEQ) Regional Plan 2005-2026. This plan identified Sippy Downs as a “major activity centre” within a regional network (Figure 4), with a special economic role as one of 14 knowledge hubs within South East Queensland (Office of Urban Management, 2005, pp. 73, 88). At a local level, Sippy Downs previously had been identified by Maroochy Shire Council as a “district centre” for the expansion of the knowledge-based economic sector within its local government area. The USC, Innovation Centre Sunshine Coast (ICSC) and the business and technology precinct were recognized by Maroochy Shire Council as economic development catalysts (Maroochy Plan, 2000, pp. 85-86).

In effect, the SEQ Regional Plan increased the role and function of Sippy Downs, necessitating an amendment of the Maroochy planning scheme. Other initiatives that necessitated the master plan review included the: (1) Queensland government announcement of a new health hub (public hospital) in Sippy Downs in the area formerly earmarked for the knowledge/technology precinct (Premier and Trade media release, May 16, 2005); (2) plans for a new motorway interchange with implications for the town’s street network and precinct uses; and (3) development applications for the town centre core that challenged the extent of retail floor space and its built form as envisioned by the Maroochy Council’s master plan (2002).

The key urban development opportunities gained and lost over the urban planning history of Sippy Downs will now be summarized. The key historic gains are fourfold. The first is the outstanding growth of the University of the Sunshine Coast, with a current student population of approximately 5,000 and a projected student population of 15,000 by 2021. A second gain is the concurrent growth of the surrounding residential precincts in Chancellor Park, with about 7,000 residents by 2005 and a forecast population capacity of 15,250 in Sippy Downs (Sippy Downs Town Centre Master Plan, 2006, pp. 13-15). Thirdly, there is a cumulative effect of the university’s and council’s various master planning review processes since 1994 for both the university campus and future town centre, as they have engaged landowners and government
agencies to build a shared vision. The result is that a shared vision exists and is clear between stakeholders. A final gain was The Innovation Centre business incubator, which is operated by the Innovation Centre Sunshine Coast Pty Ltd (ICSC) and was launched on February 7 2002.

The key losses include the fact that there has been no establishment of a corporate entity (e.g., Development Corporation) to consolidate sites, drive, coordinate, and implement the vision—the creation of Sippy Downs as a knowledge town. In addition, the separate staged development of Chancellor Park’s residential and western commercial precincts were undertaken according to a market driven, suburban, car-based model without the same master planning rigor applied to the town core and university campus. Finally, there was the loss of a potential rail link identified in the Sippy Downs DCP (1997) as a result of the subsequent Caboolture to Maroochydore Corridor Study (2000). The combined result of the gains and losses is that the whole urban area known as Sippy Downs is fragmented, with poor vehicular and pedestrian connectivity between residential precincts, the university campus and future town centre. Past short-term planning studies also failed to anticipate the creation of a 400ha green field urban development area south of Sippy Downs (Palmview) between 2018 and 2035, with an ultimate population of 20,000 people and 9,500 dwellings (Draft Caloundra City Local Growth Management Strategy, 2006, pp. 107, 110).

Stakeholders (Figure 5) interviewed for the Sippy Downs knowledge town case study included representatives from the University of the Sunshine Coast (USC) (knowledge sector), Maroochy Shire Council (MSC) (local government authority), Innovation Centre business incubator (ICSC) (business sector), and the Sippy Downs and District Community Association (SDDCA) (community sector). The researcher is professionally connected to Sippy Downs’ planning history, as he was employed by the MSC between 1994 and 2005 as an architect/urban designer. The author

Figure 3. Sippy Downs Town Centre Master Plan overlaid on aerial photograph (Adapted from Maroochy Shire Council, 2006, p. 32)
has thus participated in and provided advice for most of the planning studies conducted on Sippy Downs during that period.

CAUSAL LAYERED ANALYSIS OF SIPPY DOWNS AS A KNOWLEDGE HUB

The first research objective was to identify the driving forces and factors of successful knowledge-based urban development. What qualifies as a “success” is open to interpretation, and indeed, is not systematically defined across the contributors of this book. From a macro perspective, the qualities of success are, in this chapter, assumed to be sustainable, multi-dimensional and holistic.

For these reasons, the International Institute of Sustainable Development’s framework was adopted in the survey methodology as a means of identifying environmental, social, economic, and political forces of change shaping the development of Sippy Downs as a knowledge hub. These forces of change relate to causal layered analysis’ systemic layer of causal explanations. Arguably, such a complex, multi-dimensional development challenge requires a method of analysis to unpack the multiple layers of causation. Causal layered analysis (CLA), a method developed by Inayatullah (2004) within the Futures Studies field, provides a means of doing this. CLA also allows a comparison of the perceived causal relationships or explanations between different stakeholders.
Litany: Regional Collaboration Rhetoric

An overview of the CLA undertaken in this research (Table 1) reveals that the stakeholders share the same litany about the urban problem. This problem statement acknowledges that, historically, Sippy Downs has developed in an uncoordinated way, and far more regional planning and infrastructure delivery is needed to realise the official vision of a university town/knowledge hub. Interestingly, each stakeholder perceives himself as a key agent of change or driver to improve future collaboration.

Systems: Urban Qualities and Outcomes as Place Leadership Indicators

At the systems layer of reality, there are several key success factors shared by the MSC, USC, and ICSC. The first of these is an environmentally sensitive design for an attractive boutique centre for people, with a vibrant public realm, and an identifiable sense of place. In addition, all three exploit a switched on locale of social/lifestyle advantage for knowledge workers and a place with multi-functional community facilities. The USC and ICSC also are the main drivers of regional
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development in terms of the knowledge sector and economic diversification for the Sunshine Coast. The MSC through its economic development branch and Maroochy Economic Development Advisory Board currently are leading the realization of Sippy Downs’ business and technology precinct with the Queensland Department of State Development and Innovation. Finally, the MSC, USC, and ICSC recognize that stronger proactive regional planning/leadership is needed to broker desired development outcomes.

The community association’s perspective differs from the other stakeholders, as well as being more pessimistic about the past, present, and future development of Sippy Downs. Environmentally, the SDDCA perceives that the scenic landscape quality of openness is threatened by continued urban development and believes that the “Town in the Bush” character image in the town centre master plan (MSC, 2006, p. 41) is nonsensical, as most of the existing bushland will be cleared for the built form. Socially, they believe that community development of a sense of belonging, spirit, and awareness of town issues is needed to counter isolation/marginalization from town decision-making. They also believe that Chancellor Park residents are switched off from the knowledge economy while the USC is switched on. Economically, whilst the SDDCA believe the USC is a catalyst for economic advancement, they pragmatically realise that commercial interests (developers) will shape the form and character of the future town centre, including its business activities. In regard to governance, all stakeholders concede that they are playing planning catch-up with both social and physical infrastructure.

Worldviews, Planning Paradigms and Myths

Stakeholders were asked to position the worldview that underpins Sippy Downs’ significance and development reach within the global knowledge economy. They also were requested to describe the planning approach or paradigm that guides its development. At the worldview layer of reality, all stakeholders agreed that the residential community’s mindset is predominately local, whilst the USC worldview is global, being a node within the global knowledge economy with international connections. The potential exists for a greater shift toward a glo-cal (think globally and act locally) worldview for both residents and ICSC’s enterprises, based on two factors. First, from the SDDCA’s perspective, all residents have migrated into Sippy Downs over the past 13 years and thus have national and international family/former business connections. As spatial and social divides between the USC Campus and surrounding residential community are addressed through better telecommunications and permeable mobility infrastructure (e.g., with the proposed USC bus green link to Chancellor Park), a shift toward a glo-cal mindset should occur. Second, from the ICSC perspective, the knock-on effects of new enterprise start-ups (currently 25 at 10 more per year with a 90% survival rate), with a target market split of 30% local, 30% glo-cal, and 30% global, will enable a growing world-centric mindset and market penetration.

The stakeholders’ perceptions of the planning paradigm guiding the development of Sippy Downs are perhaps most opposed between MSC and the other players. MSC articulated more clearly the paradigm influencing its own planning practices, whilst this was more tenuous for the USC, ICSC, and SDDCA. For MSC as the local planning authority, their efforts encapsulate a shift from a performance-based planning approach to an emphasis on prescription and more guidance in order to clarify the desired development outcomes. This planning approach is designed to respond to the pressures of ad hoc development and infrastructure provision due to increased growth, and to improve the Council’s capability to lead the development of the town centre. Their planning commitment was demonstrated by their deferment of all development applications in the
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proposed town centre until the completion of the 2006 master plan. MSC also acknowledge that its poor governance (political consistency) track record has contributed to past, lost opportunities or inappropriate development outcomes in Sippy Downs. However, the causal layered analysis exposes the tension between the desired planning product and process, whereby, each relates to different planning paradigms. The products (the town centre master plan and development code) relate to the modernist planning paradigm of “rationality; comprehensiveness; scientific method; faith in state-directed futures; and faith in planners’ ability to know what is good for people generally, ‘the public interest’” (Sandercock, 1998, p. 62). In contrast, the planning process relates to the social learning and communicative action model (Sandercock, 1998, p. 95), in which the planner is no longer the key expert actor. The planner is rather a learning partner and critical listener willing to include local citizens (and stakeholders) and their experiential knowledge in the planning process. Planning is thus seen as more about ethical commitment and equity, enabled by the concept of reflective practice, rather than modernist-planning’s emphasis on professional expertise and efficiency. At the myth/metaphor layer of reality for MSC, the image that represents the current role of the planner for the development of Sippy Downs is “facilitator, strategic listener with understanding to guide the ship” (MSC stakeholder interview, Sept. 28, 2006); which aligns with the social learning and communicative action planning paradigm. Later, this planning paradigm is related to the New Urbanism movement’s process emphasis on community-design engagement to generate/elicit knowledge.

In contrast to MSC’s planning paradigm, the community association does not perceive that there is an overriding planning quality addressing the ad hoc development of the town. The SDDCA believes that the town centre master planning process reflects a reasonable listening approach, but their metaphoric image of MSC’s planning role is as controllers wanting more control. The USC sees a comprehensive master planning and development control and regulation approach in the various studies to date, however at the myth layer, the metaphor representing the role of the planner is as an inadequate partner with too narrow a view. Alternatively, the ICSC sees a slow planning approach behind the pace of development, even though the town centre vision is broad and attractive. For them, the scope of the implementation of the vision has not been regional, as evidenced by the loss of development opportunities such as the Health Hub or the lack of local government support within the region for a business accelerator. This perceived planning paradigm “without substance” aligns with their metaphor for the role of the planner as a shadow (non-image), absent from the town (ICSC stakeholder interview, Sept. 29, 2006).

At the myth/metaphor layer of reality, the desired future role of the planner for the development of the town is more consistent amongst stakeholders. The ICSC’s metaphor is a Sippy Downs Development Agency with tough vision, meaning that the planning authority has the pragmatic capacities to make it happen according to the vision. MSC’s metaphor also is to act as an implementer of the plan. USC’s metaphor for the planner is as a regional broker of development, whilst the SDDCA’s image of the planner is as a creator/innovator of the town. Likewise, the myth/metaphor for Sippy Downs (as a place) is similar amongst stakeholders (Table 1), and, arguably, is best captured by the statement, “a funky town as a ‘third space’ for collaboration and creativity” (ICSC stakeholder interview, Sept. 29, 2006). The stakeholders’ stories about university towns across the world, from which Sippy Downs could model itself, were diverse. Historical exemplars, such as Oxford, UK, or the University of Virginia, USA, seemed inappropriate in terms of a specific environmental character, but desirable from socio-spatial integration and cultural vitality perspectives. Australian models included Mawson Lakes
and the University of South Australia (Flinders Campus), Bond University, and Varsity Lakes on the Gold Coast, and the Technology Park, Bentley, adjacent to the Curtin University of Technology in Perth. In contrast, the community association promoted the distinct image of kangaroos on the USC campus, which is becoming world-renowned, as one worthy of maintaining as a signature of sustainable development.

Table 1. Causal layered analysis: creation of Sippy Downs as a knowledge town

<table>
<thead>
<tr>
<th>Layers of Reality</th>
<th>Stakeholder Perspectives</th>
<th>Maroochy Shire Council</th>
<th>Innovation Centre Sunshine Coast (Enterprise sector)</th>
<th>Sippy Downs and District Community Association</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Litany</strong></td>
<td>University is “the catalyst” and driver for regional development in the knowledge economy within a political milieu of unfocused leadership and parochial competition.</td>
<td>Whilst the university is a catalyst to diversify employment in the local economy, the MSC Master Plan communicates the town’s vision, facilitating and guiding the preferred form of development.</td>
<td>The university and SC innovation centre are the main drivers of multi-dimensional (enviro-socio-econo) interaction and collaboration for the town’s development.</td>
<td>Historically, Sippy Downs has developed in an uncoordinated way contrary to the idea of it being a university town. Collaboration is beginning through the efforts of the community association and MSC.</td>
</tr>
<tr>
<td><strong>Worldview</strong></td>
<td>Community at the moment has a local mindset. University has a global worldview with serious international connections. The town has the potential to be more global.</td>
<td>Local/regional mindset dominates the development of the town – unaware of the importance of the university as a node within the global knowledge economy.</td>
<td>University and the Innovation Centre SC is a node within the global economy. 30% of businesses have a local market mindset, 30% global and 30% global with USC having the strongest international connections.</td>
<td>Social divide: community residents mainly have a local mindset, whilst the University mindset is global. Both have the potential to be more (glo-cal) in their actions.</td>
</tr>
<tr>
<td><strong>Myth/metaphor for place</strong></td>
<td>Live, work, play neighborhoods with “boutique” town centre – fulfilling the promise and the potential.</td>
<td>A new university town. Funky town as a “third space” for collaboration and creativity.</td>
<td></td>
<td>Self-sufficient, switched on community with access to town’s social and knowledge infrastructure.</td>
</tr>
</tbody>
</table>
Local Planning Capacities to Create a Global Knowledge Hub

The second research objective was to assess the local capacity and responsiveness of urban/regional planning practices in terms of transforming a green field site into a knowledge town within the global knowledge economy. The effectiveness of the regional planning practices shaping Sippy Downs as a knowledge hub was assessed in two ways. The first method was based on stakeholder evaluations conducted during the survey interviews. The second method was based on the holism policy/action audit using multi-dimensional development criteria. This holistic model was developed to “bridge the schism between planning theory (the ideal) and practice (the real)” that is evident in the urban planning field (Daffara, 2007, p. 292).

During the stakeholder interviews no one agreed with the following statement, “Our collective planning efforts are effective and coordinated.” However, partial agreement to this statement was reported by key stakeholders MSC and USC, whilst partial disagreement was recorded by the ICSC, and disagreement to strong disagreement by the SDDCA. The local community association’s poor assessment of the town’s planning and delivery is most likely born out of frustration caused by the fact that the provision of social and physical infrastructure currently lags behind community needs (e.g., health hubs, policing services, community facilities—youth centers, libraries, meeting spaces, public transport, broadband ADSL2). The key factor influencing the majority of stakeholders’ partial agreement or disagreement to this statement is the discrepancy between the explicit policy rhetoric for coordinated action and collaboration; and the poor planning framework (or entity) to implement and monitor the development of Sippy Downs.

A strengths, weaknesses, opportunities, and threats (SWOT) analysis conducted as part of the interviews revealed the major factors obstructing the creation of a knowledge town/hub. The urban planning weaknesses recognised by all included: (1) the lack of intergovernmental and stakeholder coordination to facilitate desired development; and (2) the fact that little effort had been made to overcome the land management and development proposition challenges created by multiple land owners across Sippy Downs (other than various master plans bootstrapped together). With the benefit of hindsight, one stakeholder suggested that a “Development Authority ought to have been established in 1994 to land bank key sites for the staged development of the town centre and inner residential and knowledge precincts” (ICSC stakeholder interview, Sept. 29, 2006). As these areas still are undeveloped, it is perhaps not too late to establish such a town corporation. Other options include the establishment of a “place management taskforce and system” (MSC stakeholder interview, Sept. 28, 2006) or “stronger direction and coordination from the State Government’s Office of Urban Management (OUM) with the Coordinator General” (USC stakeholder interview, Oct. 6, 2006). These steps could help realise the regional objectives for Sippy Downs by establishing it as a knowledge hub. From the community association’s perspective, one significant weakness of the urban planning process is “the poor sense of community and lack of awareness of the existence of the USC and the SDDCA” (SDDCA stakeholder interview, Oct. 26, 2006) due to the rapid growth of the residential population and the spatial isolation of the residential precincts from the university campus. This stakeholder also emphasized (as noted above) the delayed provision of appropriate social and physical infrastructure.

The stakeholders’ perceived threats to the development of Sippy Downs as a knowledge hub and university town are threefold. The first is the uncoordinated social infrastructure planning between Councils of the Sunshine Coast and possible competition from other urban centres within the region for resources (e.g., Maroochydore, Kawana, Caloundra Aerodrome Transit
Orientated Development, and Palmview future development area). Second, the stakeholders are concerned that the environmental degradation and social impact caused by the urban development of Palmview, a new town of 20,000 people adjacent to Sippy Downs, could trigger another review of the Sippy Downs Town Centre Master Plan (2006). Finally, another perceived threat is that developers could challenge the town centre’s urban design outcomes, and that the MSC may not maintain the community goodwill to ensure incremental development applications and approvals consistently realise the master plan vision.

According to the holism policy/action audit, planning practices for the development of Sippy Downs scored poorly, with a policy focus on only 9 of 16 development criteria and a policy activity score of 12 from 32, or 37.5%. The audit (Table 2) revealed that planning policies exist but that uncoordinated action currently occurs for the provision of housing, energy efficiency, placemaking, and public spaces, community safety/belonging, memorable spaces, healthy places, responsible good urban design (that meets human needs), and sustainable habitats. More relevant to the knowledge economy, neither whole town policies nor coordinated actions/programs exist that facilitate the life-long learning citizen, the building of creative communities, or community governance and self-determination. Modest action is occurring in the context of inter-cultural leadership and inclusion, primarily through the annual Festuri multi-cultural festival that occurs at the USC with regional support. At the metaphysical level, neither policies nor coordinated action/programs exist that facilitate the development of personal spaces of meditation/worship, self-awareness, and actualization, new sacred public spaces, and a town of collective enlightenment and peace.

Sippy Downs’ low policy activity score indicates an uncertain future for the successful realization of its urban vision, namely the establishment of a knowledge hub within the regional and global information economies. This is particularly true given that strategies aimed at the psychosocial and metaphysical urban qualities are missing from the town’s holistic development agenda. These attributes, such as learning citizens and conscious self-determining communities that value cultural diversity, are described in Phillip Daffara’s (2007) integral city meta-framework. They are the same attributes that underpin Richard Florida’s (2002) proposition that communities tolerant of difference are an essential factor for attracting the creative talent of knowledge workers. The main problem revealed by the holism audit is the lack of consistent delivery of coordinated action, infrastructure, and advocacy aligned to existing regional planning policy to achieve the vision. This matches the anecdotal evidence provided by the stakeholder interviews.

Solutions and Recommendations

Planning options are drawn from the preceding analyses by the author. From this, the main lesson is that stakeholders believe that regional planning and collaborative place management is better than uncoordinated development driven by the market. Given the known threats, a far greater level of place management is required for Sippy Downs for two reasons. First, to realise Sippy Downs’ vision as a regional knowledge hub, and second, to structure plan the orderly urban development of land in Tanawah, north of and adjacent to the future town centre (currently a peri-urban area experiencing change). The place management options (presented in order of their extent of state and local legislative head of power) are: (1) a Sippy Downs Development Authority to develop the town centre precincts and knowledge precinct; (2) a Sippy Downs Taskforce chaired by a Place Manager appointed by the Queensland Government’s OUM and Department of State Development to ensure regional planning out-
# Table 2. Meta Criteria for holistic city development (Daffara, 2007)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Meta Criteria</th>
<th>Policy</th>
<th>Coordinated Action for Sippy Downs</th>
<th>Holism rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Affordable housing for all</td>
<td>Maroochy Plan and Social Plan;</td>
<td>Market forces</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>Eco-efficient Production and exchange</td>
<td>Maroochy 2025; Sippy Downs Master Plan; University MP</td>
<td>Development assessment; University development program</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>Providing Communal places (public spaces)</td>
<td>Sippy Downs Master Plan</td>
<td>Contributed assets through Development assessment</td>
<td>[1]</td>
</tr>
<tr>
<td>Bio-ecological</td>
<td>Urban design adds to Personal sensed experiences</td>
<td>Sippy Downs Master Plan</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>Urban design ensures Healthy human habitat</td>
<td>Sippy Downs Master Plan</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>Guidance (‘truth claims’) for “Good” urban form and aesthetics – humane places</td>
<td>Sippy Downs Master Plan and Local area code</td>
<td>Development assessment</td>
<td>[2]</td>
</tr>
<tr>
<td></td>
<td>Deep Ecology Awareness (Healthy habitat for ‘all’ living entities): Sustainable Habitats</td>
<td>Maroochy Biodiversity Strategy; Sippy Downs Master Plan</td>
<td>-</td>
<td>[1]</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>Programs for the Learning Citizen (Opportunities for fulfilment of personal dreams and expectations)</td>
<td>-</td>
<td>University of the 3rd Age</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td>Building Creative Citizens (Personal agency and action)</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
<tr>
<td></td>
<td>Inter-cultural Leadership of inclusion (respecting diverse cultural dreams, values systems, norms and memories)</td>
<td>Maroochy 2025 University Diversity policy</td>
<td>Regional intercultural festival: “FESTURI”</td>
<td>[2]</td>
</tr>
<tr>
<td></td>
<td>Developing community governance/social capital (Collective knowledge, agency and action)</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
<tr>
<td>Metaphysical</td>
<td>Spaces for personal spiritual beliefs, myths, and rites</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
<tr>
<td></td>
<td>Raising Self awareness + actualisation (personal causal unity)</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
<tr>
<td></td>
<td>Building new Sacred Public Spaces (e.g. interfaith and transfaith chapels)</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
<tr>
<td></td>
<td>Vision for Collective enlightenment / ‘Bliss’ – the peaceful city</td>
<td>-</td>
<td>-</td>
<td>[0]</td>
</tr>
</tbody>
</table>

Score ratings: 0 = no policy, no coordinated action; 1 = policy, no coordinated action; 2 = policy + coordinated action
comes are achieved; (3) the appointment of a Place Manager by MSC to network and improve integration of intergovernmental service delivery and stakeholder collaboration using a *town action plan*; or (4) *business as usual* as the market drives development. The degree of development certainty falls and implementation risk rises as one moves from option one to four.

In regard to the exercise of political power and the resolution of stakeholder conflicts, a development authority/corporation is perceived to be more authoritarian as the planning and implementation powers reside in a corporation legislated by the state government. In contrast, a Place Manager and collaborative taskforce would employ more democratic and participatory processes in an attempt to reconcile stakeholder interests and intra-governmental responsibilities. The university and arguably the business community would have the most to gain through a stronger regional planning governance model (options one or two) that delivered Sippy Downs as a knowledge hub, whilst Maroochy Shire Council would have the most to lose by no longer being the planning and development authority for the town.

For these reasons, the USC has been publicly debating and advocating for the amalgamation of Sunshine Coast Councils1 (Maroochy, Caloundra, and Noosa). Amalgamation provides an alternative model of achieving a regional planning framework without the creation of a development corporation. Five months after the stakeholder interviews for this case study, the Queensland state government announced the creation of a local government reform commission with legislative powers to recommend the amalgamation of councils. There is a high probability that a new local government entity will be formed for the Sunshine Coast region, which may more effectively address the current urban planning weaknesses raised by the interviewed stakeholders of Sippy Downs’ town centre.

**FUTURE TRENDS**

The third research objective was to examine the relationship between *New Urbanism’s* design and spatial form principles/community engagement processes (which is itself a field of knowledge), and the development of knowledge hubs. From the evidence gathered through stakeholder interviews, it emerges that the stakeholders partly or totally agree with the argument that the knowledge of *New Urbanism* design principles, as expressed in the town centre master plan, is shaping the form of Sippy Downs. The idea that certain urban design/place-making principles support the economic success of KBUD relates to Florida’s (2002) argument that cultural creatives, as key players in the knowledge economy, desire authentic places with a quality lifestyle. Cultural creatives are a cross-generational group of people whose core beliefs are formed by “psychology, spiritual meaning in life, art and cultural expression, mastering new knowledge, being socially concerned, honouring women’s issues and ecological sustainability” (Ray, 2000., in Marsh, et al., 2002, pp. 105-106). The greener values-based consumer choices that motivate these cultural creatives are consistent with the proposal that towns with an identifiable sense of place are more attractive to cosmopolitan information elites. There is evidence to suggest that “urban design that respects and supports local character can attract highly-skilled workers and high-tech businesses” (New Zealand Ministry for the Environment, 2005, p. 6). Therefore the urban design aims of *New Urbanism* to create memorable, livable, sustainable places, if achieved, should act as magnets for global-minded and mobile knowledge workers. Herein is a likely trend for the future development of knowledge hubs, as the multiple values of good design and place making are accepted within cultures. Testing the relationship between good design and viable knowledge-based urban development is thus a field ripe for further research.
In this case study, stakeholders identified the following design principles as conducive to successful KBUD or the creative milieus: (1) green architecture and ecological design; (2) connectivity and accessibility between mixed use neighborhoods or precincts; (3) pedestrian friendly streets and public spaces for social interaction and leisure; (4) human scale, perimeter block development providing building edges that address and activate the street; (5) the sub-tropical landscape character of the town; and (6) an identifiable sense of place with some continuity with the area’s cultural heritage. These principles, among others, are clearly described in the master plan for the built form of the future town centre (Maroochy Shire Council, 2006, pp. 7-8) and arguably make more likely the successful development of a viable knowledge hub.

The accessibility/connectivity relationships between the spaces of a knowledge hub and its users raise another future trend and area of research. Manuel Castells (2002, pp. 382-384) argues that cities need to create new opportunities to culturally bridge, through meaningful architecture, the divide between the “space of information flows” and the “space of places.” However, more frequently, decisions are made in the a-historical space of flows that impact on the historical space of places where people live, adding to social disconnectedness.

*The culture of cities in the Information Age* [ought to] brings together local identity and global networks to restore the interaction between power and experience, function and meaning, technology and culture (2002, p. 384).

During the interview process, stakeholders identified specific development opportunities for Sippy Downs, ways of connecting local people with global knowledge networks within cultural nodes whilst architecturally expressing the meaning and purpose of these nodes. These development opportunities or nodes include improved broadband connectivity to homes and the incorporation of buildings within the Business and Technology Precinct designed to express their purpose. The stakeholders also identified a new district library, community information space and youth facility, new parks (open space network), and knowledge outposts throughout the town (including Internet cafes) as means of establishing connectivity throughout and beyond the community.

Behind the design principles of *New Urbanism* and Castells’ (2002) call for new nodes of social interaction between virtual and geographic space is *New Urbanism’s* emphasis on community engagement processes and its relationship to the development of knowledge hubs. Here lies the third future trend affecting successful KBUD. At face value, the planning paradigm informing the authentic track record of stakeholder engagement for the urban design and planning of Sippy Downs over the last decade relates to *social learning and communicative action planning*. Community and stakeholder engagement methods such as *fish bowl style charrettes* and *inquiry by design workshops* sought to elicit local tacit knowledge about the desired sense of place for Sippy Downs, and, hence, synthesize this information with best practice design principles. An intentional outcome of these processes is to raise the understanding of the value of quality urban design and to empower communities to shape their respective urban futures. In this way, the community-design master planning process creates a third space for multi-stakeholder, trans-disciplinary collaboration, and creativity. This third space and temporal node for generating knowledge is aimed, in Sippy Downs’ case, to shaping a regional knowledge hub.

The CLA, SWOT analysis, and the city policy/action holism audit undertaken in the case study revealed four conditions for KBUD applicable at a regional scale. The apparent drivers and factors for successful urban development that taps into and contributes to the knowledge economy are as follows. First, regional planning policies and
practices ought to innovate multi-dimensional, holistic urban strategies and interventions. Second, successful development requires a governance approach that drives the consistent delivery of coordinated action, infrastructure, and advocacy aligned to existing regional planning policy. Third, an authentic local vision of place-making and best practice urban design is necessary. Fourth, appropriate urban development requires a place-management approach, which creates new meaningful nodes of convergence between people, place, and knowledge networks. Convergence is a key principle that can be applied spatially within urban development and in relation to the process of knowledge generation within the global information network. These four conditions for successful KBUD point to areas for further urban sociology research in order to substantiate the social, economic, environmental, and cultural impact of each relationship.

CONCLUSION

This analysis of the development of Sippy Downs as a university town incorporated three research aims. The first was to share the KBUD drivers and factors that were discovered to apply within a regional context for a local town centre, rather than for an emerging world city competing in the knowledge economy. The strengths, weaknesses, opportunities, and threats to this urban development were discussed based on the interview responses of four key stakeholders. The main tension between the forces of urban change and the achievement of a university town, to date, lies in the ad hoc governance and regional urban planning practices adopted for the town’s development. Alternative options for improving regional collaboration for the urban development of Sippy Downs were presented with their concurrent shifts in political power.

The second aim was to identify new methods garnered from the Futures Studies field to evaluate the potential of urban planning to deliver knowledge-based urban development. Causal layered analysis and the city policy/action holism audit, as techniques for critical discursive holism audit, unpacked the multi-dimensional qualities of the regional planning practices being employed for the creation of Sippy Downs. Furthermore, the causal layered analysis revealed the shared and divergent layered perceptions held by the town’s stakeholders about its development history to date. The city policy/action holism audit showed that outside the USC campus, psychosocial, and cultural strategies to build the creative social capacity and a politics of cultural difference of the resident community are absent from Sippy Downs’ planning and policy initiatives. Based on Florida’s (2002) argument, this local capacity is critical in attracting globally mobile knowledge workers who value cultural diversity as a catalyst for creativity.

The third stated aim of this chapter was to examine the role knowledge plays in shaping the spatial form of urban development, specifically its relationship to New Urbanism’s design principles and community engagement aspirations. Evidence from this case study suggests that the application of best practice urban design to create an authentic, identifiable sense of place would be attractive to globally mobile information elites. Lifestyle values-based place-making establishes a competitive advantage within the knowledge economy by appealing to cultural creatives. New Urbanism’s planning inclusion for community participation when place-making also creates a third space for building social capital and creativity. These are necessary community qualities when ensuring successful KBUD.

The elements that have succeeded in Sippy Downs are based on the accumulative effect of successive master planning studies from 1994 to 2006, allowing a shared vision to be built among stakeholders for the university town, within a context of rapid population growth and changing infrastructure demand. Through the design
principles and participation processes of *New Urbanism*, local community knowledge was generated to shape the vision and plan for a regional knowledge hub. What clearly did not occur in Sippy Downs was the consistent delivery of proactive, collaborative, and coordinated public-private partnerships to implement the vision and master plan. At the core of this weakness is the perceived threat of inconsistent urban development assessment decisions by Maroochy Shire Council as the local planning authority. The common fear is that the urban outcomes would be built by speculative developers with lesser concern for the desired future character of the university town. This must be remedied if the town is to succeed in establishing itself as a knowledge hub. To achieve that end, this analysis has provided future directions for improving the place management and governance of the town’s development. It also has proposed future development opportunities that can foster cultural convergence of Sippy Downs’ local place experience with the power of global knowledge/information networks. Overall, the development of Sippy Downs is far from being a model for successful KBUD at the regional scale.

**FUTURE RESEARCH DIRECTIONS**

The case study identified three key relationships for further urban sociology research in order to substantiate the social, economic, environmental, and cultural impact of each relationship. For all three relationships, convergence is the key principle that can be applied spatially within urban development and in relation to the process of knowledge generation within the global information network.

The relationships that shape successful knowledge-based urban development that require further analysis and validation are:

- The cultural values of good design and place making and their economic benefits for knowledge hubs.
- The accessibility/connectivity of the spaces (nodes) of a knowledge hub to its users and broader community and their social benefits.
- Evaluating *New Urbanism’s* inclusive planning approach of community participation when place-making and how it creates a third space for building social capital and creativity.

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ENDNOTE

Chapter XVI
Emerging Role of ICT in the Development of Knowledge-Based Master Planned Communities

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ABSTRACT

With the recent trends toward knowledge-based urban development and networked society, information and communications technologies have increasingly played important roles in the daily lives of people for social interaction, learning, information, and recreation. This research is an exploratory study on how information and communications technologies have been adopted in master planned communities of South East Queensland, Australia. It examines the four roles of information and communications technologies in the master planned communities: (1) teleworking; (2) creating a sense of community; (3) promoting integrated offices and businesses; and (4) developing learning communities. More recent master planned communities in South East Queensland, such as Varsity Lakes, North Lakes, and Greater Springfield have integrated information and communications technologies for activities such as community internet portals, local business development, and for use in community learning centers and education facilities. There is a potential to attract knowledge workers in master planned communities through the inclusion of cultural amenities, information and communications technologies, and learning infrastructure. It is important that information and communications technologies, and learning infrastructure not only benefit the housing estate but also the surrounding region, thus putting a foundation for a knowledge-based urban region.

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Emerging Role of ICT in the Development of Knowledge-Based Master Planned Communities

INTRODUCTION

The new millennium has heralded in the new knowledge economy. After more than three decades of restructuring, we are now witness to significant changes as to how planning needs to be done. The issues are different to those of the industrial economy. As Yarnit (2000, p. 4) states:

It was the humble but effective plumbing and sewerage systems which lay beneath it with the railways on top, which enabled the Victorian city to grow rapidly as the economy’s driving force. Learning and communication systems will play the same role in the twenty first century...today the vital raw material for an increasingly knowledge based society is grey matter—human imagination—both its development and its use.

In recent years, demographic, economic, and technological changes are affecting the way we live within our communities. There is a growth in smaller, diverse, and aging households. There has been a shift in employment from the manufacturing to service sector jobs, increase in labor force participation of women, increase in part-time, home-based and self-employment (Gipps et al., 1996). There is increased use of information technology in our daily lives as a part of our education and leisure activities. More people are using e-mails for correspondence, the Internet for information, and depending on computers to work from home, access services, and do online shopping.

Review of literature on master planned communities and master planned estates suggests that there are a number of innovative ways developers have responded to some of the current societal trends in demography, economy, technology, and community (Ewing, 1996; Lance & Woolecock, 2003; Schmitz & Bookout, 1999). Master planned communities or estates are large-scale, private sector-driven, integrated housing developments on greenfield urban fringe sites (Minnery & Bajracharya, 1999). Master planned communities usually integrate a mix of housing types, open space, and recreation facilities, commercial and service facilities, and sometimes employment opportunities. Master planned communities usually are a product of long-term, multi-phase development programs that combine complementary mix of land uses. A trend toward online community is evolving in recent years with innovations in information technology, such as wireless broadband Internet, home automation, and community intranet.

The objective of this chapter is to examine the role of ICTs in the new master planned communities of South East Queensland, Australia. It identifies four key roles of ICT: (1) teleworking; (2) creating a sense of community; (3) promoting integrated office and businesses; and (4) developing learning communities. To provide the context of research, the chapter first reviews the recent literature on knowledge-based urban development and ICT, and discusses the ongoing debate about master planned communities in Australia. It then outlines the evolution of master planning in South East Queensland and discusses the ways master planned communities have integrated ICT in their development. Specifically it highlights how the newer master planned communities now incorporate work and learning spaces in the mix of land uses. The incorporation of work and learning along with recreation and living has implications for ICT. Last, the chapter identifies the key challenges and longer-term needs of ICT for master planned communities and their implications.

BACKGROUND

Knowledge-Based Urban Development and ICT

There is a growing body of literature on the emergence of knowledge-based urban develop-
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ment, the creative class and the networked society (Castells, 2004; Graham, 2004; Mitchell, 1995; Florida; 1995; Florida, 2002; Landry, 2000; Landry, 2006). Florida points out the emergence of new learning regions with focus on knowledge creation and learning as part of the economic and technological reorganization at global level (1995). There is competition among leading regions to attract knowledge workers by creating soft infrastructure, such as ICT, and community amenities. Florida talks about development of creative economy in regions that are tolerant, diverse, and open to creativity. Companies are shifting to locations where knowledge workers are attracted to live due to this “quality of place” (Baum et al., 2007).

According to Florida (2002), the creative class includes knowledge workers in science, engineering, architecture, design, education, arts, music, entertainment, and whose economic function is to create new ideas, technology, and new creative content. Around this core is a broad group of professionals in business finance, law, and healthcare. These knowledge workers are attracted to large cities and regions that offer opportunities for economic development as well as technological and environmental amenities.

There are strong links between ICT and the changing nature of cities and urban life (Graham, 2004). There is increasing use of new ICT, such as Internet, Worldwide Web, digital media, computers, geographic information systems (GIS), and virtual reality tools in contemporary cities and communities. With advances in electronic communications, ICT have contributed to intensification of globalization of cities networks. They have accentuated contacts and transactions both at global and local levels. Graham and Marvin (2004) have analyzed ways in which emerging ICT technologies and privatized system of provision of ICT infrastructure are contributing to the splintering of metropolitan areas across the globe.

Castells (2004) sees the emerging relations between cities and ICT as inherent conflict between “space of flows” of transnational technological movements with the “spaces of places” of local communities. He discusses the struggles of networked economy with the changing nature of social identities of local people. He sees the key role of planning, urban design, and architecture in addressing this challenge by ensuring strong complementary linkages between metropolitan economy and the quality of life of residents. There should be effective city governance based on strong community engagement so that local communities do not get subsumed under the global and technological imperatives. He highlights the need for developing shared, democratic public spaces to connect the local people in globalizing cities.

Mitchell (2004), in his books The City of Bits (1995) and E-Topia (1999), explores the ways cities are shaped by the interplay of urban spaces, physical movements, and ICT mediation. He discusses the challenges of relations between virtual and face-to-face community, and the need to consider the roles of virtual and physical spaces, electronic connections, as well as physical linkage. Likewise, Graham and Marvin (1996) in their book, Telecommunications and City, see the city as an amalgam of urban spaces and electronic spaces. Landry (2000) suggests the need for both virtual and real meeting places as part of creative cities development providing flexible setting for interaction. There is an important role of research and education, sophisticated information and communication system, and cultural resources for the development of creative cities (Landry, 2000). He suggests that the city of the future should be a learning city not only focusing on knowledge workers but also on reflecting/learning from its experiences from past and encouraging communities to learn to understand, manage ongoing transformations in the city. He also points out the need to redefine the scope of creativity by looking beyond assumed creativity in creative industries and media to social and other forms of creativity.
in the mass of ordinary, day-day, dormant creativity (Landry, 2006).

This brief review of literature on knowledge-based urban development, the creative class, and ICT provides a useful basis for understanding the role of master planned communities in these ongoing transformations in the cities. The chapter will now discuss some recent debates and discussions on master planned communities.

**Master Planned Communities**

There is a growing connection between knowledge-based urban development and master planned communities. Unlike traditional and piecemeal subdivision development, master planning is the new (popular) form of development in recent years in Australia. In general, a master planned community provides an opportunity for a large parcel of land to be planned comprehensively and implemented in stages. This new form of developments targets provision of high quality of life/place, knowledge-based activities (including ICT and education).

Master planned communities have opportunities to become part of the knowledge-based urban development. With its focus on place-making and creating a sense of community, master planned communities can play a role in attracting knowledge workers. Master planned communities have many of the natural amenities (e.g., water access, natural environment) and constructed amenities (e.g., sidewalks, cafes, libraries, quality schools, research libraries), to which the knowledge workers aspire (Clark, 2003). One key question is whether master planned communities can become both attractors for creative talent (knowledge workers) and contribute to production of knowledge.

Schmitz and Bookout (1998) provide a useful discussion on emerging ideas and concepts in planning and design of master planned communities. They highlight the need for understanding consumer lifestyle requirements and technological innovations in order to develop successful master planned communities. They identify some of the emerging ideas for master planned communities include:

- Integration of information technology with community designs and governance measures.
- Capitalizing on education.
- Environmentally responsible development.
- Planning for social interaction.
- Focus on community safety.
- Wide range of housing type based on market segmentation and product diversity.
- Integrating employment within master planned communities.

There are recent intense debates about the nature and impact of master planned communities in Australia (Bajracharya et al., 2006; Costley, 2006; Gleeson, 2004; Gwyther, 2005; McGuirk, et al., 2007). McGuirk and Dowling (2007) have identified three key dimensions—governance mechanisms, housing market context, and nature of community—to understand the forms and outcomes of master planned estates. Gwyther (2005) argues that modern developer-led master planned estates in Western Sydney cannot produce a genuine ideal of community. She suggests that urban design is merely used as a marketable tool for master planned communities. Gleeson (2004) calls the current development of master planned communities by developers as “master programming” lacking genuine participation by communities. He advocates the need for a participatory model of master planning instead of contemporary “master programming” in order to build active social networks, localized shared vision and place attachment.

Costely (2006), on the other hand, looks into the question of whether master planned communities are generally a good thing in terms of equity, security, and cohesion using master planned communities in Australia as examples. She is
optimistic that developers have a potential to influence the development of successful communities through integration of innovative learning and employment opportunities. Likewise, Bajracharya et al. (2006) have argued that strong combination of community engagement and innovative place design can contribute to making master planned committees that are livable and vibrant with a strong sense of place for local communities. They have developed a framework for place-making in master planned communities with focus on key elements of community, place, and image.

This brief background review of literature provides a useful context for discussion of master planned communities in Queensland and the emerging role of ICT in these communities.

**MASTER PLANNED COMMUNITIES IN SOUTH EAST QUEENSLAND**

In considering the development of master planned communities in South East Queensland, it is fair to say that each of them, to some extent, represents a particular stage of thinking about master planning. The locations of the four master planned communities of Forest Lake, Varsity Lakes, North Lakes, and Varsity lakes are shown in Figure 1.

**Forest Lake**

Forest Lake, located just on the western perimeter of Brisbane City, is a master planned community with a population of about 30,000 and covers about 1,000 hectares of land. It was one of the first planned developments built by Delfin in South East Queensland in the early 1980s and was completed recently. One of the significant ideas implemented by Delfin includes provision of housing mix, including small lot developments, to cater to different demographic groups. Further distinguishing features include: (1) schools that shared resources and facilities in a more integrated education precinct; (2) the provision and support for community facilities co-located near schools and shopping centers and a comprehensive recreational network of facilities that facilitated community interaction. This model represented an example of best practice in Australia through the decades of 1980s and 1990s.

**Varsity Lakes**

Varsity Lakes is located in Gold Coast and is in close proximity to Bond University, golf courses, and a number of canal residential estates. It is being developed by Delfin Lend Lease (Delfin became part of Lend Lease a few years ago). Varsity Lakes is a popular residential community for empty nesters, professional couples, and mature-age groups due to its high quality built form and provision of business parks and amenities. Started in 2002, it covers an area of 343 hectares and contains a

![Figure 1. Location of master planned communities in South East Queensland](image-url)
range of residential, mixed use, community and business land uses, focused along the foreshore of a lake and a range of open spaces. It has a strong focus on attracting business and offices within its development. The Varsity Lakes ICT delivers extensive communication network for businesses within the development, including e-commerce capabilities. The developer has established an economic development strategy in which to grow the regional economy in partnership with state government and Gold Coast City Council.

**North Lakes**

North Lakes, another master planned community located 25 km north of Brisbane also has been marketed as a place for people to live, learn, and work in an environment of “innovation and creativity.” With an area of 1,000 hectares, it is planned for 20,000 residents and employment opportunities for 13,000 people with a mix of residential, retail, commercial, and industrial areas. While initially developed by Lensworth Group and Lend Lease, North Lakes is now part of the Stockland Group. North Lakes has a town center, learning center, and many educational facilities as part of the development.

**Greater Springfield**

Greater Springfield development with a current population of 9,000 is being developed by Springfield Land Corporation on 2,860 hectares of land west of Brisbane. It currently is the largest master planned community in Australia with an expected population of about 80,000 people when fully developed. It includes the suburb of Springfield, Brookwater development (in alliance with Medallist golf development), and Springfield Lakes (in alliance with Delfin Lend lease). It has a campus of the University of Southern Queensland, a new town center, and office parks as part of the development. It also has a number of educational facilities, such as Springfield College, Woodcrest College, and St Augustine’s College.

The Polaris Data Centre is planned to be the ICT and technology infrastructure hub of Greater Springfield’s CBD. NEC Australia, a leading ICT company has developed alliance with Springfield’s Polaris Data Center to develop ICT capabilities for Springfield’s residents and employees. The company is planned to provide WiFi and wireless Internet hotspots around the Springfield community. The Centre will form part of the core ICT and technology infrastructure of Greater Springfield’s CBD.

We now provide examples on how ICT currently are being adopted or planned in the master planned communities of South East Queensland.

**ICT AND MASTER PLANNED COMMUNITIES**

Clark (1998, p. 25) points out that through ICT a new form of mobility is influencing land development and “savvy developers are beginning to consider what these emerging technologies to the business of building homes.” In general, in the development of mixed-use development and master planning, ICT has been adopted in four fairly standard ways. These include: (1) teleworking; (2) creating a sense of community; and (3) developing integrated offices and businesses; and (4) developing learning communities. The adoption of ICT to date has coalesced upon these four broadly accepted themes.

**Teleworking**

Mitchell (1999) noted that while the industrial revolution separated home and workplace, the digital economy brought them back together. With increasing trend of suburbanization of employment and growth in small home businesses,
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provision of information technology is becoming a tool to attract those demographic groups who would like to set up home businesses, or work from home (Schmitz et al., 1998). The ICT provided the opportunity to work from home and that this home may, in fact, be some considerable distance from the client or headquarters. The selection of homes is not only based on its ICT infrastructure but also on amenity and lifestyle in the communities.

With increasing access to the Internet, there is growing opportunities for working from home in master planned communities of South East Queensland. The local intranet also affords opportunities to connect to local businesses. Much of the housing design in master planned communities does not have provision for proper home office. However, in Varsity Lakes there are specific allotments adjacent to its town center designed for SOHO (Small office/Home office) dwellings that can accommodate office or retail space on the lower floor for work-from-home professionals and small businesses.

There is limited data on the extent to which the households have availed themselves of teleworking opportunities in master planned communities. It also is not clear to what extent the presence of ICT has attracted the residents to master planned communities and how have they changed the working patterns of these residents? Given the potential for isolation within home-based settings, Diamond and Lafferty (2000) suggest that collective forms of telework, such as community telecenters, could provide greater quality of work.

Developing a Sense of Community

To date, one of the important uses and rationale for ICT in master planned communities has been attempts to create a sense of community through a local intranet. In the case of Springfield, the community intranet was initially being achieved through a deal between Apple Inc. and the local developers. In general, when the basic infrastructure was laid down, the cable required for intranet also was put in place. In the earlier part of Springfield development, it was primarily the schools and households that were linked. To date, a local not-for-profit community group, Springfield Lakes Online Group Inc. (www.ourspringfieldlakes.com) has established and is managing a local community information service through the community Web portal. This intranet function is envisioned primarily as a community notice board. The Springfield Lakes Online Group provides residents with access to information on local businesses, community groups, and state government services. It also provides a range of information on local businesses relating to computer and IT needs, such as e-mail hosting, computer maintenance, Web site development, sale of data projector and electronic white boards. Some of the newsletters community updates of Springfield Lakes are also available from the Web site.

Similarly, Varsity Lakes online is a “state-of-the-art community portal that provides residents with opportunities to interact with each other and access local community information, resources and services” (www.varsitylakesonline.com.au). Some of the uses of the Web site are identified as to: (1) receiving up-to-date information and news on Varsity Lakes; (2) making bookings online for sport and recreational facilities; and (3) contacting local businesses and services.

Community intranet helps develop informal networks among community members and disseminate information about community activities. It also can be one of the effective tools for community safety programs (e.g., neighborhood watch). Alongside these attributes, the community Web sites can be an important marketing tool for attracting new buyers who are technologically literate. However, despite the descriptions of how the local intranet is being adopted in local schools and households to date, there has been little in-depth analysis of the contribution to sense of place or sense of communities. Although some
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of the community intranets have facilities for online discussion, it is not clear to what extent they have been effectively used to have critical debate on issues affecting the community and coming up with creative solutions to address them through community information, deliberations, and partnerships. Community intranet cannot replace sense of community achieved by face-to-face interactions; rather, it should facilitate opportunities for more physical interactions. Public spaces such as town centers, schools, and open spaces have an important role to play in physical interactions creating a sense of community. Bohl (2002) in his book, Placemaking, argues that town centers can provide the “literal and symbolic centre of the community,” as well as gathering places that are important for bringing people together. In many master planned communities of South East Queensland, such as Forest Lake, Varsity Lakes, and North Lakes, the provision of central lakes and town center as part of development have provided opportunities for people to meet, relax, and develop social relationships within the development.

Developing Integrated Offices and Businesses

The third focus has been to use ICT for attracting industry as part of the efforts to create fully integrated working communities. Broadly, efforts have been made toward equipping offices and businesses to be smart and to ensuring that business parks have access to the kinds of broadband needed to support high-tech graphics and steady data-image flow needed to support the high-end of the new knowledge economy.

The Varsity Lakes town center, “Varsity Central,” is planned to be a major business and innovation hub of Varsity Lakes with 150,000 sq m. of commercial space and the employment of 4,500 people. Development of the town center is intended to form synergies with Bond University and is proposed to include a mixture of research and development, business, information technology, education, entertainment, and retail activities. The town center contains two precincts, namely, Varsity Central and Markets Square. The Varsity Central precinct immediately adjoins the university and is intended to contain office park, mixed-use development, and education facilities. The range of businesses located in Varsity Central include those with expertise in areas such as, ICT, law, finance, education, professional services, medicine, general business services, retail, and entertainment (info from Web site). The Market Square precinct backs on to the lakes and is planned to contain a local shopping center, dining, and entertainment facilities. Varsity Central also has been fitted with commercial grade broadband facilities.

Greater Springfield development prides itself as a new city “bringing together the very best in business, ICT, education, health, retail and entertainment to one central location” (Web site). In the case of Springfield this can be accentuated by the development of the high-tech corridor, which links aerospace centre and activities at Amberley Air Force base to the airport/port nexus.

The key question to arise from the use of ICT surrounds its contribution to and impact on master planned communities. Two critical questions emerge. First, in what ways does it add to wealth creation and prosperity? Second, does it build social capital? Social capital relates to the resources available within communities as a consequence of mutual support, reciprocally, trust and obligation. Falk and Harrison (1998, p. 610) propose that it is the quality and quantity of interactivity that will enhance the development of social capital. These questions point to the need for in-depth research.

Developing Learning Communities

North Lakes, a master planned community under construction to the north of Brisbane, has developed an innovative learning center as part of its
new town center development. The learning centre includes state-of-the-art library, education, and training center with multimedia technologies, meeting facilities, as well as an Enterprise Center specializing in adult education and vocational training. The sports facilities include a swimming pool complex and an indoor gymnasium with space for netball and basketball activities.

Involving architects, urban designers, library specialists, education planners, and town planners, the developers have sought to create the center as a resource for life-long learning. It has maintained strong links with schools and local businesses in the town centre. One of the innovative aspects of this learning center was that facilities were created not only for the use of residents but also for economic and learning opportunities for the whole local council (Pine River shire). The developer worked closely with Pine River local council, Education Queensland, the Department of Sport and Recreation and the State Library of Queensland.

Varsity Lakes has a range of education facilities with adjoining Bond University and pre-, primary-, and secondary schools within the estate. It also is promoting itself as providing learning opportunities for diverse age groups with a range of schools and colleges. It includes facilities for “Hear and Say,” which provides learning environment for deaf and hearing-impaired children. There are plans for relocation of the Australian College of Information and Technology within the development to offer innovative courses in information technologies. There is more focus on supporting alternative educational models (such as, integrating research on impact of Varsity Lakes within the local curriculum).

In the case of Springfield, the developer first developed alliance with the Apple Macintosh system in the 1990s to provide an ICT network linking all houses, schools, and businesses within the housing development. All homes were sold with a PC and Internet access. Woodcrest School in Springfield integrated multimedia technologies as part of learning.

Recently, the Springfield Land Corporation has developed an 18-hectare “Education City” as part of its development. A range of educational institutions, such as the University of Southern Queensland, the Bremer Institute of TAFE, Union Institute of Languages, ABC Development Centre, and Australian City College provide different levels of education for all age groups. It has a student village accommodating about 110 students (eventually housing 750 students when complete), and a retail village with convenience store. Education City is planned for up to 10,000 students with provision of residential and other allied retail facilities for students. The education precinct is linked to high-speed, dark-fiber networks within the development. The Springfield Web site (www.greaterspringfield.com.au) contends.

This unique campus is designed to bring together education, training and learning providers in the one location, providing the full spectrum of education from childcare to post-graduate studies. Offering multiple and flexible learning pathways for students of all ages and backgrounds, this unique education and research hub is a glimpse into the future of learning.

Greater Springfield also is developing a Health and Wellness precinct with focus on integrated community healthcare. The range of facilities will include medical services, hospital facilities, and allied health and wellness facilities, such as aged care and retirement center, education and research facilities. This is planned to be located in the heart of the Springfield CBD alongside education, retail and business precincts, and is to become the regional hub of health services for the surrounding region.

Likewise, there is the proposed development of Springfield Central, which is planned to house about 10,000 people in mixed-use, medium-density and high-density housing development with easy access to parklands, shopping, walking, and
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education city. These accommodations may be attractive to the knowledge workers who are likely to be working in education and health precincts in the future.

From the discussion above, it is clear that some of the more recent master planned communities in South East Queensland, such as Varsity Lakes, North Lakes, and Springfield, have made some good attempts to develop learning networks. However, more needs to be done to attract knowledge workers and contribute to knowledge-based urban development. First, there has to be strong investments in learning infrastructure, such as good quality schools, libraries, training centers, and research facilities. Second, there could be a deliberate strategy in master planned communities to attract knowledge workers through investments in ICT infrastructure, and provision of natural and constructed amenities to enhance the quality of place. More opportunities need to be provided for flexible working in terms of provision of home offices, telecommuting centers, and spaces for establishing incubator businesses, and research and technology parks. As part of the development, attention needs to be given to providing cultural amenities, such as music, theatres, and cultural centers, in order to make the area more vibrant and active, while at the same time promoting local culture and art. There is potential to bring together knowledge capital, creative capital, cultural capital, and social capital to promote knowledge-based urban development in master planned communities.

It is important that master planned communities do not become an island of learning; it needs to engage and share the knowledge and technology with the larger region (state government and local governments have a key role to play in achieving this outcome through leveraging their funding and approval processes). Knowledge workers in master planned communities can be instrumental in knowledge transfer from within master planned communities to surrounding region through mechanisms such as, voluntary work, social interaction, skill development, and community engagement programs.

FROM CYBER CITY TO LEARNING COMMUNITIES

The questions surrounding ICT point to a much larger issue raised by Yarnit in the opening paragraph to this chapter. It needs to be recognized that community development is underpinned by what Falk and Harrison (1998, p. 611) term an “undercover activity”: that is, learning activities that are “the oil in between the cogs.” The quote by Yarnit suggests that the key infrastructure that will underpin the post industrial cities is learning. Thus, we argue in this chapter that while ICT are important, they are really only the tools to assist in the delivery of and access to learning. The key infrastructure for smart master planning in the knowledge economy will be learning.

More recent efforts in regard to ICTs have shifted the emphasis away from technologically integrated communities to the ideas of a master planned community being a living and learning community. As important as the broadband, the cabling, and the Internet are as basic infrastructure support, the emphasis has shifted from the technology per se toward the activities of learning and the role of learning in achieving planning objectives.

As outlined in the introduction, it is learning (rather than the technology) that is seen as the glue of a community. The effectiveness of contemporary knowledge-based economy depends on online and effective learning processes (Senge, 1990). Senge (1990) has demonstrated that the productivity of new knowledge economy is enhanced by social capital (trust). Since business now is a key activity in master planned communities, besides a significant contribution to “community development” the learning activities simultaneously are “good for business.”
Focus on advanced information technology in schools within master planned communities can give competitive advantage to the children in their learning activities. The use of information technology can contribute to emergence of learning communities so that connections to education can go beyond the housing estate and to the surrounding region. Recent studies from the U.S. suggest that there are prospects for the use of advanced information technologies in low-income communities as well (Schon et al., 1999). One study reported how participation in computer clubhouses helped people gain skills to attain a job in the computer industry afterward, and gave examples of personal and community empowerment through neighborhood-based electronic bulletin boards.

Learning infrastructures, such as tertiary education institutions and schools, can play a positive role in the regional economy. In the context of Australia, Allison and Keane (2001) have done a case study of the University of Sunshine Coast in the northern region of South East Queensland and found that it had many positive impacts in the surrounding areas through strong partnerships between the university and region. They have identified six key linkages of the USC into the regional economy: (1) enterprise development through clustering of business and industries around university; (2) skills transfer through locally relevant courses such as adult tertiary education; (3) sourcing and supply chains in design and construction of campus buildings; (4) technology and research development in areas such as local horticulture and agricultural activities; and (5) partnerships and networks with local councils; and (6) community involvement in local sports/health related activities. Each of the six dimensions identified by the authors are highly relevant to make positive contributions by learning institutions in master planned communities for the surrounding region, thus contributing to the development of a wider learning region.

The above discussion provides a good theoretical basis for developing master planned communities with strong focus on ICT and learning. The chapter will now discuss some of key challenges for integrating them.

**CURRENT ISSUES AND FUTURE IMPLICATIONS**

It is clear that specific tools of ICT can play many positive roles in the daily activities of the people. It also needs to be recognized that ICT should be seen as part of the whole picture in which the focus is on living and learning communities. The chapter now discusses the current challenges and opportunities for ICT and learning development in master planned communities.

**Use of ICT**

While ICT can benefit the community, there also are some concerns and issues that need to be addressed. The online community can create a situation where there is less face-to-face interaction, heavy dependence on technology for day-to-day life, undefined working timetable, and less separation between home and work. With greater ICT access at home, young people are increasingly spending more time indoors with their electronic gadgets and computers than playing outdoors. The indoor home entertainment activities may impact on the health and fitness of the younger generation while at the same time making some of the neighborhood parks in the master planned communities underutilized. Similarly, people are increasingly becoming dependent on electronic security systems than community-focused neighborhood watch programs. These trends can negate the creation of sense of community within the master planned communities.
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Cost of Provision of ICT Infrastructure

Another issue that needs to be dealt with is the initial high cost of provision of ICT infrastructure, which discourages developers to make such investment. For the residents, additional cost of ICT infrastructure included in the house/land prices, as well as the cost of maintaining the advanced telecommunication technologies, could be an issue. Another related concern is due to rapid change in technologies. There may be some unwillingness on the part of developers in making major investments in ICT infrastructure if it become obsolete in a few years (e.g., development of wireless communication technologies may have impact on prior investments in conventional copper wire or fiber optic cables).

Design of Houses

A third issue revolves around the design of houses for provision of home offices for telecommuting. Many of the houses under construction are conventional three- or four-bedroom houses with no specific provision of home offices. House plans need to be designed in a way to make flexible provisions for home offices with separate access to meet the clients for business purpose.

Establishment of Telecommuting Centres

As part of the town center development of master planned communities, telecommuting centers with access to information and communication technologies can be set up. These could play an important role in reducing trips of the commuters to work. They can share facilities, such as video conference facilities, broadband networks, e-mail, telephones, virtual libraries, virtual data storage facilities, remote printing and publishing. These telecommuting centers can be linked to homes and other businesses through demand-responsive transport modes, such as minibuses. Telecommuting centers should be located so that people can have face-to-face interaction in cafes and in informal environments as well.

Attracting businesses reliant on outsourcing of work from centralized offices is another option for development in master planned communities. With high rents in central business districts, some of the clerical and branch office functions can be located in the suburban locations. They also can attract businesses doing e-commerce with provision of secure ICT infrastructure.

Development of Learning Precincts

To attract knowledge workers, master planned communities need to give greater focus on development of learning precincts with focus on learning, innovation, skill development and skill transfer, creativity and research. There is a case for setting up office space for incubator businesses to support start-up companies. While inner city areas often have a range of cultural amenities, the master planned communities located in the fringe of cities often have limited cultural amenities, such as theaters, art galleries, and performance centers. Likewise, there should be strong links between schools, colleges, and universities, and with the communities around the region to form a part of learning network in the region.

Collaboration with ICT Suppliers and Local Councils

The developers of master planned communities would have to collaborate with ICT suppliers for mutually beneficial partnership for development of online community. Through this collaboration, there is potential for the community to access online interactive entertainment and customized information depending on the interests of residents. The new technologies also can be used for expanding the local businesses.
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The local council needs to have a good understanding of the skill base of the population so that appropriate learning and training opportunities can be expanded. There also is potential for online marketing of products developed by local communities. Councils, in collaboration with educational institutions, will have an important role to play in skill development and training to those groups with problems of affordability and access to electronic technologies. Councils also can be used as a community net, as a means to get immediate feedback on council’s plans and programs as part of the community consultation processes.

Support from the State Government

The state government has an important role to play in facilitating the development of ICT and learning communities with its Smart State Agenda. As part of its agenda, the state government has initiated a project called e@ble and established an industry Internet portal to share relevant ICT information between all levels of government, ICT providers, developers, and communities. Likewise, it proposes to mandate broadband infrastructure in new multi-tenanted buildings (Queensland Government, 2006), but this could be expanded to new master planned communities as well. The example of partnership between state government, Pine River Shire, and developers in establishing a learning center in North lakes for the benefit of residents is a good example of innovative ways in which to gain support from the government.

Long-Term Maintenance of ICT Infrastructure

There are the long-term questions of how to provide the ongoing ICT infrastructure support and maintenance in the future. In Queensland, it is the responsibility of the council to maintain the basic services within the housing development after the developer completes the project and hands it over to the council. For the ICT to play an important role in the future development of master planned communities, the councils and developers need to have a long-term plan to develop and manage the ICT infrastructure in consultation with the infrastructure providers and the community.

CONCLUSION

Integration of ICTs can play a positive role in the development of knowledge-based master planned communities with focus on living, working, learning, and recreation. This study has identified how ICT has been used in master planned communities of South East Queensland for teleworking, social interaction, the development of integrated office and businesses, and creation of learning communities. The research also identifies a number of challenges as well as opportunities to integrate ICT in master planned communities to attract knowledge workers and develop learning precincts as part of the development. There is a need to include social, cultural, and technological amenities to enhance the quality of place of master planned communities for knowledge workers. The chapter also has highlighted the importance of integrating learning opportunities in master planned communities for the development of the larger region, thus putting foundation for a knowledge-based urban region. There needs to be investment in advanced IT infrastructure, alliances with ICT suppliers, support from the government, and the establishment of telecommuting centers, cultural and learning precincts and networks as part of knowledge-based master planned communities.

We need to learn from ongoing social, economic, and technological transformations in the cities for future development of master planned communities with strong focus on learning region and quality urban places.

This exploratory research can provide a useful basis for more focused and in-depth analysis of
Emerging Role of ICT in the Development of Knowledge-Based Master Planned Communities

FUTURE RESEARCH DIRECTIONS

Here are some of the areas for future research directions on links between ICT, knowledge-based urban development, and master planned communities.

1. The first is the examination of the effectiveness of ICT for democratic community governance of master planned communities. Community intranet portals in master planned communities are primarily used as information bulletin, but these also can be an effective tool for community engagement, discussion forum on critical issues, and opportunities affecting the communities. To what extent do communities use community intranet and how do they support the face-to-face interaction of communities? How do virtual community networks work in parallel to physical networks in master planned communities? To what extent has it been used for community engagement and involvement in planning for future development of master planned communities?

2. The second topic could be looking into potential roles of ICT in minimizing the digital divide between knowledge workers and others living in master planned communities. What are the means to ensure that ICT bridges gaps between digital haves and have-nots in the master planned communities?

3. Another area of research could be the opportunities for attracting knowledge workers in suburban master planned communities. What type of amenities needs to be provided in master planned communities? What should be the nature of creative or knowledge-based precincts in master planned communities? How are they going to be different from amenities found in inner urban locations?

4. There is a need for development of a framework for knowledge-based master planned communities linking ICT, knowledge workers, learning infrastructure with the development of a larger learning region. How will ICT and knowledge-based urban development change the nature of master planned communities in the future? How do we bring balance between virtual and physical networks, creative and social capital in master planned communities?

5. Lastly, future research areas should include investigations on how ICT and learning infrastructure within master planned communities can benefit the surrounding region. To what extent are ICT and knowledge-based urban development a marketing tool of developers? How can it make a genuine difference to bring a sense of community and have positive impact on the larger community outside master planned communities so that they do not become merely gated and wired communities without much links with the immediate region in which they operate?

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Emerging Role of ICT in the Development of Knowledge-Based Master Planned Communities


Emerging Role of ICT in the Development of Knowledge-Based Master Planned Communities


ADDITIONAL READING


Afterword

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SPATIAL DIMENSIONS OF KNOWLEDGE PRODUCTION

Knowledge-Intensive Industries: A New Hope for Urban Policy Making

Around the world, in both academic and political arenas, promoting the role of knowledge-intensive industries in urban and regional development has become a hot topic. The importance of knowledge-based urban development has been fully realized, not least because in the majority of industrialized countries of the “Old World,” traditional industries have gradually lost their role as the predominant urban employers, with the new industry sectors in some cases unable to compensate for the local job losses that have followed. The new hope is that knowledge-intensive industries could form a new future-orientated economic base for cities. Often this hope is expressed without a clear definition of the nature of knowledge-based industries, their location requirements, and with little insight into the complex milieus of these industries.

Dortmund, an industrialized city in Germany, an engine of economic development based on coal and steel, is a pertinent example. The city shares a common experience with many other cities around the world in establishing a new university. For almost 100 years from the turn of the 19th century, the city lobbied hard to get a local university. Finally, the university was built in 1964, far from the city on a greenfield site to accommodate 25,000 students and 3,000 academic and non-academic jobs. Subsequently, the interest in the university vanished gradually and the long-aspired academic institution was treated like an industrial plant at the fringe of the city. For more than three decades, the university slept like Dornröschen, the famous sleeping beauty, a long and undisturbed fairy tale sleep. For a long time, the university was not really an institution of which the city would be proud. It was just seen as a new piece of urban infrastructure offering higher education for the sons and daughters of redundant miners and steelworkers, and the new local middle class. However, when the last coal mine was closed in 1987 and the local steelwork was sold to China in the year 2001, the university became the new hope for the local political class, the desperate unions, and economic business establishment—an anchor from where future economic development should depart. Not overnight,
though within a few years, the university and its technology park in its precincts have become the image profiling factor for urban marketing and infrastructure policy. This new role as a significant chess figure in the local political game was new for the university, one which it still does not really know how to deal with.

The Spatial Dimensions of Knowledge Space

Knowledge and the various dimensions of knowledge spaces could be explored at four different spatial levels: global (including continental), national, regional, and local levels. Each of these levels has its own spatial, political, and of course, economic rationales.

At the global level, we observe a real and perceived hegemonial domination of American knowledge-intensive industries that cluster around main tertiary education and research hubs in the USA. These clusters (e.g., Silicon Valley, DNA Valley) are located around the most famous universities on the east and west coasts of the USA (e.g., University of California, Massachusetts Institute of Technology), and at a few other locations such as Minneapolis, St. Paul, Michigan, the Research Triangle, and Austin, Texas. The locations outside the USA include, South East England, Vancouver, Toronto, Sydney, Melbourne, Auckland, and selected technology locations in India. In such locations, English, the dominating global academic language, provides them with a competitive advantage. However, all over urban Europe, significant concentration of knowledge-intensive industries exists also. These knowledge-based developments have primarily taken place in Germany, France, Italy, Spain, Finland, Switzerland, and the Netherlands. They all have more than national importance and historically have been able to attract knowledge workers from all around the world, eager to study, research, or work in established R&D milieus. Language and international image, as well as successful marketing and specialization, are among the factors that “make” and favor such places at the costs of others. However, new hubs of knowledge-intensive industries are rapidly developing in Asia and Latin America, particularly in China and Brazil. And once language constraints are removed by new (simultaneous) translation technologies, the comparative advantage of English-speaking locations gradually will vanish, and new opportunities will rise for other urban regions.

At the national level, knowledge-intensive industries are concentrated and have expanded in major metropolitan regions, such as London, Paris, Madrid, Berlin, Milan, Helsinki, and Amsterdam, and major city regions, such as Munich, Stuttgart, Hamburg, Manchester, Toulouse, and Lyon, where the knowledge economy, high-tech production (e.g., biotech, defense, aerospace) and creative industries are flourishing rapidly. Single traditional gown towns beyond metropolitan or city regions such as Heidelberg, Göttingen, Uppsala, Pisa, Lund, Coimbra, Győr, and Aix-en-Provence compliments their national knowledge systems, though the distance between the metropolitan/urban knowledge core and the knowledge hinterland is unavoidably large. And as the more soft location factors (e.g., tolerance, quality of life) gain importance as factors for attracting the internationally and nationally mobile knowledge workers, the more established and spatially expanding knowledge cores will dominate the knowledge-based urban development of the creative urban regions.

At the regional level, it is the metropolitan region, where knowledge-intensive industries find appropriate production conditions. In many regions across Europe, all hard and soft location factors have been actively used for the knowledge-based development of these places. Though within the metropolitan region, a region that usually stretches out more than 100 kilometers to the hinterland, the locational pattern of knowl-
edge-intensive industries may vary. Depending on
the urban system within the metropolitan region,
medium-size towns adjacent to the metropolitan
core can accommodate concentrations of knowl-
edge-intensive industries, such as Heidelberg and
Darmstadt in the Greater Frankfurt region, and
In other metropolitan regions, such as Paris, a
polycentric system of decentralized and newly
established suburban knowledge hubs on the ur-
ban fringe has evolved over the last three to four
decades. Similar development patterns also can
be observed in the Kansai region in Japan, in the
Seoul metropolitan region and in Taiwan.
In general, the location decisions of large
knowledge clusters, such as universities, tech-
nology and science parks, and knowledge com-
community precincts, at the local level, are rather the
outcome of a multitude of political, economic, and
socio-cultural factors, which scarcely follow any
principal rationale developed by the local admin-
istrations. They are more the outcome of decisions
made for whatever reasons and sometimes even
centuries ago. Usually, major reasons for decisions
made are, the availability of land, property endow-
ments, or political directives to reuse derelict land
at strategic locations. When exploring the spatial
pattern of knowledge in city regions, it becomes
obvious that knowledge-intensive industries have
not, to date, followed a particular spatial logic. And
whether a knowledge complex in an urban district
is embedded in a multi-functional environment
or not, largely depends on the long history of a
location and the success of strategic urban plan-
ing and local community concerns. Heidelberg,
in Germany, is a good example. The university in
the city is surrounded by urban quarters full of
lively and entertaining quarters, where students
and staff meet after work, sometimes even be-
fore they enter the university premises scattered
around in the gown town. When the university
had to expand to the city fringe, the newly built
functional environment of the new out-of-town
campus did not accommodate all the desired places
for non-functional activities, and to do that in a
newly built environment is extremely difficult
in many ways. The consequence is that the new
campus is pretty much like a factory. Once the
classes or the work is over, the campus precincts
are deserted.

University and City: Two Quite
Different Policy Arenas

Today, Dortmund is experiencing a love affair
between two partners, university and city ad-
ministrators, who are pursuing quite different
development agendas. Such love affairs have
become common in European cities, which do
not have hundreds of years experience as more or
less mono-functional gown towns, such as Oxford,
UK, Göttingen, Germany, Uppsala, Sweden, or
Bologna, Italy. This is a new challenge for ur-
ban governance. The fact is that the rationale of
guiding urban development and the rationale of
managing a university are significantly different.
This is particularly true in a policy environment,
as in Germany, where universities are public
institutions, depending largely on the budget of
a state government and, as a rule, regulated by
state legislation from examination rules to consti-
tutional regulation and to labor laws. Moreover,
any physical extension is designed and controlled
by a powerful state-owned and controlled prop-
erty development institution, which is reporting
directly to the Minister of Finance of the State.
Local politicians face problems in identifying
partners at the universities with whom they
should communicate. The university on the other
side does not have easy access to the local politi-
cians and the urban development administrators.
Thereby, the university is only one actor of the
local knowledge-intensive industries. Others are
the manifold public organizations, semipublic and
private research institutions, which are typically
located at the city.
Afterword

Location Factors for Knowledge-Intensive Industries in the City

Around 150 years ago, efforts to plan the industrial city began. A much appraised and quoted concept for such an industrial city was designed by Tony Garnier, a French architect, who lived in Lyon from 1869 to 1948. In reality, however, most industrial cities in the world have just been developed without any master plan or blueprint. They have evolved, more or less unplanned, just following selected functional criteria and reflecting the rationales and vested interests of large industrial corporations. Nevertheless, and until today, cities around the world zone industrial land in their zoning and land use plans in order to prevent the development of an uncontrolled mix of housing and industrial areas, with mutually negative implications. Conditions and infrastructural requirements have changed since. Modern knowledge-intensive industries require quite different location criteria and other infrastructure than a steelwork or an automotive factory. Today, it is rather a balanced mix of functional criteria, which is important, when planning for knowledge-intensive industries. With a few exceptions only, planning knowledge-intensive industries on greenfield sites or in urban or semi-urban environments, with little or no knowledge potential have not been quite successful. It is much more than a rational land use plan, which is required to turn a city or an urban district into an attractive knowledge environment.

What are the essential location factors of knowledge-intensive industries? First, people who are living in a place matter most to the knowledge-intensive industries, whereby their educational background, knowledge, skills, and competence are essential in attracting these industries and investment. Knowledge-intensive industries require competent and committed knowledge workers, who commit time and competence to the work as well as to the local civil society. Thereby, second, it is the social- and family-related infrastructure, which does play an essential role for household decisions, primarily the existence of good kindergartens and excellent international schools, and quality hospitals. Third, it is an easily accessible and affordable cultural and leisure infrastructure that influences family decisions of knowledge workers to stay in a city or to move to another one. And in double academic households, decision-making conditions are even more complex. All this, in turn, is linked to the local housing market and the opportunities to buy or rent a house or an apartment not too far away from the working place; in short, housing affordability plays an essential role. Finally, household connectivity to transport networks plays a role, which allows easy access to national and international transport networks. Besides these, a complex bundle of location criteria linked to the knowledge environment plays a critical role, such as: academic traditions; the profile of local institution of tertiary education; the academic reputation and the international connectivity of local knowledge-intensive industries; the image and innovativeness of research institutions; and the local knowledge milieu and accessibility to local knowledge infrastructure, such as libraries or specialized laboratories. These factors cannot be planned and implemented within a short time. Either they already are an essential feature of a knowledge location or they require a holistic view and understanding, as well as comprehensive strategic policies and investments, initiated and promoted by, far-sighted, visionary, creative, communicative, political and professional leadership.

How to Condition, Plan and Manage Knowledge Spaces and Intelligent Territories at the Local Level?

Given the fact that locally embedded universities, as spearheads of local knowledge-intensive industries and the local government are quite different institutional entities, and have dif-
different agendas, ways and means of continuous communication between the two main actors have to be explored. Experience shows that this would require persons at both sides who organize communication processes beyond daily business routines in a full-time job. They are responsible for continuous monitoring and benchmarking, and review of the mutual implications of institutional policies on the respective partner. The aim of closer cooperation between the two entities is the comprehensive local and interregional promotion of local knowledge-intensive industries. Additionally, it may make sense to involve other key stakeholders in the city in this process, not just to decorate the city or university, or to give individuals another function, but to benefit from their respective competence, experience, insight, and networks. This would best be achieved by setting up standing committees with individuals from the university, local knowledge-intensive industries, and the city administrators. Such committees would be responsible for strategic actions to further improve the local knowledge environment, and for bi-annual reports on the state-of-the art of knowledge-intensive industries of the city. Additionally, a catalyst document could be prepared on past achievements, reviews, and assessments on urban development with reference to local knowledge-intensive industries. This could guide local policies in this field, including policies on affordable housing, public transport, and immigration to maintain the quality of life for national and international students, academic staff and scientists, and their support and service environments, and knowledge-based urban development.

**Knowledge, Health and Food, the Cornerstones of Local Economies**

There are three essential key cornerstones of local economies in the global future. They are three economic complexes, namely knowledge, health and food. They provide most of local employment in any urban region. They are and continue to be the local territorial capital profiling sectors of the city, and they strengthen local identification sectors of the city, and they strengthen local identification and embeddedness. Such complexes will have to be the main concern of local economic politics, and they will strongly influence local agendas to maintain the quality of life of citizens. While health and food mainly serve local communities, the knowledge complex is the externally visible flagship. That is, why much more political attention has been given to the crucial role these complexes play in urban development. In the past, the spatial dimensions of knowledge-intensive industries have often been neglected. The policy passion for attractive landmarks, remarkable architecture, and international public events in cities around the world has shown that the quality of urban space plays a critical role in continuously attracting talent, tourists, industries, and investments.

For above reasons, knowledge-based urban development is a key planning approach for attracting and retaining knowledge workers and knowledge-intensive industries, and also for the nurturing of knowledge cities. Furthermore, knowledge-based urban development provides an important collaborative development framework for all parties (public, private, academic, and community) in the development of future strategic (and knowledge-intensive) urban and regional policies.

**ENDNOTE**

The rich territorial capital of Europe is its cultural diversity, with quite different political, economic and cultural traditions. Consequently any effort to describe the spatial dimensions of knowledge is biased by the respective cultural context of the observer. The author’s observations are influenced and formed by 32 years of work at the University Dortmund, Germany, a university at the edge in an old industrial city.


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